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ABSTRACT

This master's thesis is intended to show that the computer, as an aesthetic medium, will create the social conditions whereby the population will be able to develop the aesthetic bridge of self-actualization, and that the increased numbers of people involved with their own personal psychological development and growth will create social conditions that will further enhance the development of the potentials of humanity as a whole. Developmental tasks are considered in light of recent developments in systems theory using Prigogine's model of "order through fluctuation" and some field theory descriptions to synthesize ideas and concepts that operate across many fields of inquiry. Six major topics are discussed: (1) areas of concern; (2) systems and hierarchies; (3) symbol formation and meaning, including Maslow's hierarchy of needs, three motivations and their strategies, the field of evaluation, the system of focus, and the somatic to social bridge; (4) aesthetics, including explanation and presentation, the divine proportion, levels of experience, social dimensions of experience, and two paths to transcendance; (5) the exosomatic extension of the vehicles, including tools, machines, and automata, as well as automata and art; and (6) the computer as a medium for art, including the evolution of the computer and the potential it offers for communication in all dimensions. Eight figures are appended and 44 references are listed. (MES)

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THE COMPUTER AS A MEDIUM FOR ART: AESTHETICS AND THE PROCESSES OF MIND

A Thesis

Presented in Partial Fullfillment of the Requirements
for the Degree of Master of Arts

by

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The Ohio State University
1985

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The Computer as a Medium for Art: Aesthetics and the Processes of Mind

Introduction

The Areas Of Concern

In the ancient Greek myth of Psyche[1] we are told of a beautiful princess who had without intention eluded the arms and vows of all her potential suitors. Upon consulting the oracle of Apollo, her concerned father, the king, was told to dress her in mourning and take her to the summit of a high mountain where a winged serpent should find her waiting alone and take her off to be his bride. After spending most of the night in terror on the mountain, Psyche found herself swept up and carried aloft to a beautiful palace.

Each day was spent in solitude, but after she retired each night, her lover would arrive, shrouded in the night, to make love to her. Her curiosity as to who her lover might be was fired on by the jealousies of her sisters, but her lover had asked her, as a sign of trust, that she never try to look upon him in the light. But the images of some horrible beast that might turn on her and devour her frightened her and led her to follow the spiteful advice of her sisters to wait until her lover fell asleep to light a lantern and see who he might in fact be.

That night, after her lover had fallen asleep, Psyche lit the lamp given to her by her sisters and shone it upon him. In the light of the lamp she saw Eros, the beautiful son of Aphrodite, and she felt the strong passions of love welling up inside of her. Upon realizing her betrayal, she gasped, (dropping the knife that her sisters had given her to kill him), and lamp oil splashed down upon the sleeping Eros and he awoke and fled, wounded and betrayed.

In an attempt to regain her husband, Psyche appealed to Aphrodite for help, but Aphrodite, in her zeal to keep Psyche (a mere mortal) from re-uniting with her son, presented her with a number of seemingly impossible tasks to overcome. These tasks represent the plight of soul (Psyche) to re-unite with love (Eros). Within the context of this paper, the tasks presented to Psyche reflect the psychological stage of development that involves differentiation and integration. Hillman (1975), beginning with a quote from a letter by John Keats writes:

> "Call the world if you please, 'The vale of Soul-making.' Then you will find out the use of the world...." From this perspective the human adventure is a wandering through the vale of the world for the sake of making soul. (p. IX)

Soul can be understood as the ecosystemic relationship of the organism to its environment. Hillman goes on to say:

> By soul I mean, first of all, a perspective rather than a substance, a viewpoint toward things rather than a thing itself. This perspective is reflective; it mediates events and makes differences between ourselves and everything that happens. Between us and events, between the doer and the deed, there is a reflective moment-- and soul-making means differentiating this middle ground. (p. X)

Just as the lamp of Psyche drove away Eros, the light of differentiation drives away the original relationship between the organism and its environment. The tasks presented by Aphrodite, or beauty, represent the attempts of the Psyche to re-unite with the original unity experienced by the organism as pure relationsip and meaning. The four tasks, in contemporary terminology can be seen to represent classification and categorization, strategy, courage and aesthetics. Let us now take a look at these tasks and see how they relate to psychological growth.

In the first task, Psyche must sort out a vast quantity of different kinds of seeds mixed up in a large pile. She is assisted by waves upon waves of field ants that separate out the seeds and place them in their respective piles. This task represents the classification and categorization necessary for the psychological growth of the individual.

In the second task, Psyche must find a way to get the golden fleece of a fierce breed of sheep. In this instance a river reed instructs her to wait until the sheep leave the dense thicket to come out by the river in the evening. Then she will be able to go into the thicket to gather the fleece that has accumulated in the branches. It should be pointed out that she felt great despair and considered throwing herself in the river until this strategy was revealed to her. The importance of strategy to psychological development is that it gives one power over the things that one has classified and categorized. In fact, one would be hard pressed to separate strategy from classification and categorization except in the instructive atmosphere of a tale.

The third task that occupied Psyche was to fill a flask with the black water from the source of the Styx, that horrible river that flows through hell. This task was performed by the sharp-eyed and powerful eagle and represents the need to follow through with one's convictions in spite of the risk to life and its comforts. It also reflects the need to confront and accept the shadow side of our development, the part of ourself that we leave out in the process of creating an identity.

The final task set for Psyche is to take a box for Aphrodite into the underworld and to ask Proserpine to fill it with beauty. On the way to the underworld, Psyche passes by a tower which offers her guidance to Proserpine's palace. First she is instructed to go to a great hole ~~in the~~ earth where she is to descend into the earth until she comes to the river of death. There she will find Charon, the ferryman, who for a penney, will take her across the river. Then, straightway to the palace, she would find Cerberus, the three-headed dog, guarding the doors. If she offers the creature a cake, however, it will let her pass.

All went according to instructions and Proserpine filled the box with beauty as requested. But as Psyche was returning, she felt that since her own beauty was languishing beneath the toils set upon her by Aphrodite, that she might be able to take a little bit of beauty from the box for herself. She was concerned that Eros would not find her very appealing anymore. But as she opened the box, she fell into a deep sleep.

Eros, in the meantime had recovered from his wound and escaped from his mother's confines and sped forth to find his beloved Psyche. When he found her, he wiped the sleep from her eyes and replaced the contents of the box. Later, after reconciling matters with the gods, Psyche was given immortality and wedded again to Eros, hence Psyche and Eros, soul and love are eternally united.

The journey into the underworld reflects the relationship that the soul has with dreams, fantasies, images and death. It is this relationship with the experiential, chaotic side of life that shapes the way we differentiate and address the ecosystemic relationship. This task reflects the need to integrate our world-making activities into an experiential realm of relatedness.

As mentioned above, strategy is an essential ingredient for the psychological development of the soul. But in the broadest sense, there are three classes of strategies, each with its own underlying motivation. The first class of strategies is motivated by the will to survive. The second class is motivated by the need to actualize one's own unique potentialities within the possibilities made available in the social-cultural arena. The final class of strategies is to transcend all strategies by a realization of what the Hindu philosopers call Atman/Brahman. Very rarely does the individual operate within the realm of a singular class of strategies, but rather finds shades of all three in any encounter, confrontation or decision.

Thus the discussion that follows will be concerned with the "vale of soul-making", the tasks of Psyche, or more properly, the process of self-actualization. But we will also be concerned with the over-riding directive within which these processes are organized and toward which they are proceeding. Rilke (as quoted in Hall, 1980) refers to the beginning of awareness at this level of directives in a poem entitled "Initiation".

Whoever you are, go out into the evening,
leaving your room, of which you know each bit;
your house is the last before the infinite,
whoever you are.

Then with your eyes that wearily
scarce lift themselves from the worn out door-stone
slowly you raise a shadowy black tree
and fix it on the sky; slender, alone.
And you have made the world (and it shall grow
and ripen as a word, unspoken, still).
When you have grasped its meaning with your will,
then tenderly your eyes will let it go....

Thus the tasks of Psyche will be shown to be but an intermediary stage of psychological development and aesthetics will be seen as the bridge beyond this stage. It is not by accident that the final task involved the import of beauty, nor that Eros succeeded in coming to Psyche's rescue at this point. I might also add that their remarriage as immortals represents the stage of psychological growth that was just referred to in the title of Rilke's poem. Furthermore, we will discuss the unique qualities inherent to the computer as a vehicle for raising the aesthetic participation, and therefore the general psychological awarenesses, of the general population.

The Intent

It is the intention of this paper to show that the computer, as an aesthetic medium, will create the social conditions whereby the population, on an unprecedented scale, will be able to develop the aesthetic bridge of self-actualization. As mentioned above, this bridge offers the possibility for Self-actualization or the transcendance of soul-making.

The claim made in this paper, therefore, is that the computer, as aesthetic medium, will contribute to an overall elevation of awareness for society as a whole. This raising of consciousness will have repercusions in the enhancement of social possibilities for the development of the unique potentials of the individual. I am not making the claim, at least not directly, that the computer will enhance the potentials of any given individual, but rather that the increased numbers of people involved with their own personal psychological development and growth will create social conditions that will further enhance the development of the potentials of humanity as a species.

The Approach

The tasks, or processes of soul that we will be concerned with in this paper, and the model of description upon which they will be based, will be considered in light of some of the most recent developments in systems theory. Since we will be looking at these processes in terms of growth and evolution, we will be borrowing from the work of Ilya Prigogine (Prigogine & Stenger, 1984).

Prigogine's evolutionary model of "order through fluctuation" is useful for inquiries into and descriptions of processes of growth and irreversible transformations. In classical or Newtonian descriptions of physical phenomena, the world is reduced to trajectories of objects in absolute space-time coordinates. This billiard ball model of the world required outside force and denied any internal interaction between the windowless monads of existence. The fundamental premise of the classical view was that some irreducible discrete level of matter could be found that would act as the universal building block of all of the manifest world.

The development of thermodynamics in the nineteenth century introduced a macroscopic view that dealt with populations of particles in terms of parameters like temperature and pressure. Since the second law of thermodynamics revealed that isolated systems increase in entropy (i.e., disorder) until thermodynamic equilibrium is reached (i.e., randomness), irreversibility and the arrow of time were introduced into physical descriptions. Whereas the trajectory in classical dynamics is reversible, hence the once fashionable belief that given enough information, one would be able to trace the billiard ball interactions of the universe back to its initial state, the introduction of thermodynamic description showed that this belief was, in the majority of cases, incorrect because one would encounter what Prigogine and Stengers (1984) call the "entropy barrier". "[T]o reverse the direction we would need infinite information; we cannot produce situations that would evolve into our past! This is the entropy barrier we have introduced" (p. 295).

For example:

> We may consider a small sphere rebounding on a collection of large, randomly distributed spheres. The latter are supposed to be fixed. This is the model physicists call the "Lorentz model," after the name of a great Dutch physicist, Hendrik Antoon Lorentz.
>
> The trajectory of the small mobile sphere is well defined. However, whenever we introduce the smallest uncertainty into the initial conditions, this uncertainty is amplified through successive collisions. As time passes, the probability of finding the small sphere in a given volume becomes uniform. Whatever the number of transformations, we never return to the original state. (Prigogine & Stengers, 1984, p.270)

Thus we can not predict a system by means of a trajectory, but must satisfy ourselves with the satistical future of the system. Furthermore, when the microdynamics internal to the system are seen within the macrodynmics of interacting, intrinsically random systems, probability gains a dynamic meaning that converts randomness into irreversible processes.

Thermodynamic descriptions of the nineteenth century dealt with closed systems or systems near equilibrium (which led to the pessimistic belief in the "heat death" of the the universe). Prigogine has introduced an evolutionary model of open systems far from equilibrium that create ever more complex organizations through disapative structures that pass entropy out of the system into the environment. Open systems far from equilibrium exchange matter, energy and/or information with the environment and through autocatalytic and/or cross-catalytic processes in the dissipative organization, spontaneously reorganize and evolve the system in time and space via symmetry breaks. This type of description admits a degree of creativity that permits an optimistic air of an as yet unfulfilled future. It adds the element of becoming into a description that permitted only being (classical dynamics) and disintegration (closed systems).

Prigogine developed this model while working with chemical processes, but as a description of systems processes rather than explicitly material entities, it offers a model for all processes of systems far from equilibrium. As Jantsch (1980) states: "[a]lthough these phenomena belong to very different levels of reality which are irreducible to each other, they are connected by way of homologus dynamics"(p. 56).

At the point of dynamic reorganization of the open system far from equilibrium, the stochastic processes introduced by the fluctuations in the system may also threaten the system with disorganization and "death". The introduction of chance into the autopoietic (self referencing) integrity of necessity makes this model not only useful for description, but it also offers a dynamic sense of the process of morphological growth. In the description of the processes of mind that follows, I will be less concerned with the technical accuracy in the use of Prigogine's model of evolution and more concerned with using the general dynamics its describes to address the organization and organizational dynamics of the growth of mind. One area in which the astute reader will find a variance is in my use of field theory descriptions within an otherwise Prigoginian derived description of systems. Since field theory has not as yet been described, to my understanding, within the context of Prigogine's model, I end up using the potentially incompatible descriptions in a descriptive rather than factual or mathematical fashion.

On one hand, I approach my subject with diffidence, due not only to this descriptive methodology, but also due to my limited acquaintance with the sciences. On the other hand, I feel confident on an intuitive level that there is a need to draw together, through the metaphors of many disciplines, the ideas and concepts that operate across many fields of inquiry. Systems theory has been heralded as the best approach in making this kind of synthesis, and in spite of its checkered past, I feel that it is the best framework within which to address my topic.

Systems and Hierarchies

Introduction

Since my initial concern will be with defining what the aesthetic experience is, how it differs from other experiences, and what the specific epistomological ramifications associated with that experience are, it will be necessary to focus on some definitions of the structures fundamental to a characterization of awareness itself. To do this, I have found it useful, as mentioned previously, to employ a number of terms common to the field of general systems theory. I will work primarily on the assumption that mind can be characterized as a multi-level complex of organizations that find the origin of their hierarchical interactions manifested as far back into the organisms levels of structural integrity that one chooses to look. That is, at different biological levels in the organism, for example, the cell, tissue structures, organs, etc., certain organizational structures maintain a relatively stable configuration of needs.

All of these need configurations shove their existential demands up the hierarchy of organismic structures simultaneously and ultimately manifest themselves as dispositions necessary to the existential integrity of the organism in its entirety. These dispositions become related at a primordial level of mind to various sensori-motor/affect patterns of need resolution, ambiguation or non-resolution. The combinations of all these manifest needs continually motivate the organism in its attempt to maintain integrity and growth.

Koestler (1968) calls these levels of systemic integrity Janus-faced, because each level "looks" below to the levels that constitute as well as up to the levels to which the system is a constituent. Therefore, these Janus-faced entities, as open systems within a larger hierarchy of systems, may ultimately be included in the only true closed system, the universe. (But to speak of the universe as a closed system is, in my opinion, to seek a false sense of security at best, and an unecessary closure when one considers that the concept of "universe" is ultimately a relativistic characterization that merely implies the inherent limitation of some frame of reference. But to consider the universe as a frame of reference, and hence limited, does have some heuristic value). A point to remember is that the universe of systems and hierarchies is a map of our ecosystemic embeddedness.

We will now look briefly at the three types of systems that will be relevant to the discussion that follows and then take a look at how they change characteristics within a hierarchy.

The Three Types of Systems

Since perfectly closed systems would exchange absolutely nothing with its environment (the universe, for example, has no environment), we would not be able to detect them. But when we talk of closed systems, we are ususally talking about nearly closed systems or relatively closed systems. In closed, or nearly closed systems, there is no environment and change occurs in the direction of greater and greater disorder, or toward increased entropy in a fashion described by the second law of thermodynamics.

Closed systems are impermeable or nearly so and cannot dissipate entropy (disorder). The closed system succumbs to time in terms of organizational collapse. For example, separate quantities of gas or liquid in a sealed container slowly intermingle on a molecular level into a random distribution (chaos or total entropy).

Open systems can be described in at least two ways. In the homeostatic model, which is a special case of an open system, the system remains near equilibrium and interacts with its environment by checking for certain factors involving matter-energy and/or information exchanges and by testing to see if those factors fall within certain given parameters. This process of interaction for the maintainance of equilibrium is called negative feedback. If the allowable parameters are exceeded, the system initiates action to counter the systemic/environmental imbalance and thereby maintains an ecosystemic stasis.

In open systems far from equilibrium, matter-energy and/or information is taken in from the environment and released back into the environment via what Prigogine calls dissipative structures. Closed systems cannot dissipate entropy (disorder). The closed system succumbs to time Rather than accumulating entropy (disorder), dissipative structures pass entropy out into the environment and thus maintain a state far from equilibrium. Furthermore, open systems are capable of spontaneous reorganization to a level of higher complexity through a process that Prigogine calls "order through fluctuation". One way of visualizing an open system far from equilibrium is to think of a drunk stumbling out on to the street. To keep from falling on his face, the drunk has to keep stumbling "forward" into the direction toward which he is about to fall.

The mechanistic paradigm of the human system which is derived from the physical sciences revolves around the notion of equilibrium and stasis. The cybernetic mechanism of negative feedback came to emphasized as a function of systemic integrity, rather than the growth paradigm of deviation-amplification characteristic of positive feedback. Positive feedback, which is essential to self-renewal and the processes of "order through fluctuation", has been associated with runaway systems, especially by those in the past most involved with the homeostatic description.

Positive feedback is a function of open systems. Prigogine and Stengers (1983) showed that positive feedback can create perturbations in growing systems and that when certain thresholds are reached, the system spontaneously reorganizes in terms of an ecologically defined morphology to a new, more inclusive level of organization (i.e., the system will interact in a more comprehensive fashion with its environment). Therefore, the system can be seen to have two sub-systems. The first one is involved with self-renewal while the other is involved with growth. Furthemore, the system is being resisted in its growth by the environment. It is this resistance that creates the morphological dynamics.

Open systems that are far from equilibrium, relate to time in terms of growth and complexification and can be called self-organizing or autopoeitic. Autopoeisis " refers to the characteristic of living systems to continuously renew themselves and to regulate this process in such a way that the integrity of their structure is maintained" (Jantsch,Univ,p.7). The autopoeitic system is self-referential, i.e., it knows what it needs in terms of self-reference. An allopoietic system, e.g., a machine, refers to a function given to it from outside its integral domain.

Self-organizing systems maintain a form of exchange with their environment that requires the creation of structural stabilities over exteded periods of time. These dissipative structures import free energy and catalytic elements from their environment and export entropy and catalytic reactions back out. This in its simplest expression, is the metabolism of the system. The ecological relationship is maintained by the environmental supply of "nutrients" and the asymmetry of the system that maintains the momentum of ecological exchange.

Prigogine also talks about the auto- and cross-catalytic processes in the dissapative structures of systems far from equilibrium. A catalyst is a substance or structure that increases or alters a process in such a way that less total energy is required for the process than would be possible without it while the catalyst itself remains unchanged. An auto-catalytic process is one where the products of the ongoing processes serve to enhance those same ongoing processes through self-generation. The cross-catalytic process is one where two separate products of the process serve as catalysts for the continued production of the other. These processes will be discussed in a more concrete way below to describe the triadic relationship of referents and vehicles in symbol formation.

Not all systems are complex, but all complex systems are hierarchical. Simon (1982), in an article entitled "The Architecture of Complexity", states that " If there are important systems in the world that are complex without being hierarchic, they may to a considerable extent escape our observation and understanding"(p.219). Putting aside the fact that he may be mistaking the proverbial finger pointing at the moon for the moon itself, I think that he is making an important point about how we come to know the world. (I am using the term "world" to mean the manner by which we represent and refer to the maintainance of our integrity and growth). In the event that the system lacks hierarchical embeddedness, it is isolated or closed.

Hierarchies

Simon (1982) states that a hierarchy is "a system that is composed of interrelated subsystems, each of the latter being in turn hierarchic in substructure until we reach some lowest level of elementary subsystems" (p.196). Thus the highest levels of mental differentiation will be shown to rest on the lowest levels of biological need, though the reduction of one to the other is not direct or predictable because, for example, the manner by which one can satisfy a need is somewhat open-ended. If a person needs a nutrient (biological need), to use a simple example, he or she may choose (reflection) from a relative wide variety of foodstuffs to satisfy the need. This is what Bertalanffy (1968) calls "equifinality". There is also the condition whereby a number of needs are satisfied by the same end called "multifinality".

In order to understand systems, it is helpful to understand how they are dynamically organized within a hierarchical frame of reference. Scholz (1982) states that there are at least three levels of hierarchic description necessary for the description of a true hierarchy. These three levels are of two types; structural and functional. Structural hierarchies are presented at two levels and Scholz distinguishes the two in terms of the way the nodes at one level interact with nodes at the same or other levels. The first example illustrates "subdivision" (see Figure 1) or a hierarchy of the first order where the nodes at one level aggregate to create the node at the next highest level and so forth. Most simply stated, if the dotted lines represent multiplication, the solid lines represent the equals sign. That is, A x B = C, C x D = E, etc.

(See Figure 1 in the Appendix)

The second example of structural hierarchy illustrates the relationship of subordination (see Figure 2). In this second order hierarchy, the nodes A, B, C, D, and so on, interact horizontally and vertically, as in the first type, but the relationship is not one of aggregation. The vertical lines represent organizational relationships and the horizontal lines represent control hierarchies. That is, each level represents a set of processes that must be accomplished before the next level of organization can be invoked.

(See Figure 2 in the Appendix)

In the first type, horizontal interactions represent the processes involved with aggregating the vertical resultant. These events, however, unlike the events in the second type of hierarchy, do not occur in time because the aggregation (for instance of atoms into molecules) is part of the physical structure and therefore 'does not take place', but rather 'is existent'. The first order hierarchy represents the "atomic building blocks" relative to the current frame of reference. The second order of structural hierarchy are actions that take place in time "because they represent an influence by means of matter, like the exchange of energy, or by means of (apparently) non-material communication, like the exchange of verbal communication"(p.285). This hierarchic level is inter-systemic as opposed to intra-systemic, as in the first order.

In contrast to the two types of structural hierarchies, there is a third level of the hierachy, called the functional hierarchy. Whereas the structural hierarchies could be called 'order of parts', the functional hierarchy could be called the 'order of process'.

As an illustration of this integrated concept of hierarchy, Scholz (1982) describes the human body as a hierarchy of systems. Levels 1 through 5 (elementary particles, atoms, compounds, molecules, and cells) represent the type one structural hierarchy of aggegate elements. Levels 6 and 7 (organs and physical body) represent the sum of aggregate interactions as a whole. Levels 1 through 7 on through echelon 5 (eschelon 1 through 5 being the neurophysiological hierarchy from the spinal vertebral level to the cerebral cortex) create the functional hierarchy. Hence the embeddedness of the hierarchical levels within the system as a whole.

These three levels of description are not only useful for an understanding of physical or biological systems, they are also useful in describing psychic systems. As a relatively static topological representation of the psychic structures, these three hierarchical configurations can be used as a very general description of the dynamics of mind as levels of symbolic and semantic processing. Traditionally, the three levels of mind that I am referring to are called the sensual, the imaginative and the intellectual. Robert Fludd has described the relationship of these three levels in this way.

> The Imaginative Soul links the Intellect and the Sensitive Soul by means of images. These images are "shadows" of the elements that is, of the created world, and it is they that make possible the ground on which Ratio and Intellectus can be exercised. The soul itself is a unity although it possesses different faculties. (Westman,p.200)

In an attempt to further clarify the relationship between these three levels in terms of open systems far from equilibrium, I will use the terms sensory-motor/affective, imaginal, and intellectual for reasons that will be discussed later.

The sensori-motor/affect system can be seen as the functional hierarchy, the imaginal system as the second order structural hierarchy, and the logical-syntactic would act as the first order structural hierarchy. This description is a bottom-up hierarchization of the psyche and can be useful in describing intent in terms of what Maslow calls "deficiency needs", meaning that intent arises out of the biological integrity of the system. But due to the relative nature of systems and hierarchies and their dependency on a frame of reference (and hence a frame of consistent description) the movement of information can be described in both directions. The intellectual system could be described as the functional hierarchy and the sensoi-motor/affect system as the first order structural hierarchy. From this perspective, intent is a function of reflexive operations and the symbolic givens are pressing toward meaningful integration. This is the context within which growth potential or "self-actualization" and "becoming needs" could be described. (Self actualization can be seen as the ongoing optimization of the ecosystemic relationship. This optimization is toward the unique potentialities of the individual via the exosomatic extensions acquired in the social matrix. Self-actualization can only occur in the social matrix). The fact that the imaginal level (or more generally, the vehicular level as described below) lies in the same relative position whether the overall system is described from top to bottom or vice versa is of significant concern in the discussion below on symbol formation.

This use of a hierarchic description of levels of mind is static and represents more of a map of something "out there" rather than a reflection of how we actively encounter our ecosystemic relationships. Since my description of psychological processes is dynamic, especially when I discuss the system of focus below, it is necessary to look at hierarchical description as the manner by which we are actively aware. In other words, we focus in a hierarchic manner reminiscent of Polanyi's notions of subsidiary and focal awareness.

The functional level of the hierarchy might represent what Polanyi calls subsidiary awareness. The two structural levels represent focal awareness. For example, we recognize our friend subsidarily in terms of our focal awareness. This recognition occurs within some context that contributes further meaning and recognition. Polanyi's description is helpful, but limiting within the context of this more general description. Given that awareness functions "through" a hierarchy of focusing systems, we will be concerned with hierarchies of experiential processes and not so much with topological relationships of something "out there".

I am, therefore, using the hierarchic description of open systems in two ways. In the description of mind, I am using it to show the topological relationship of the three major systems (sensory-motor/affective, imaginal and intellectual) in a relatively static, diagrammatical way. In the description of the active processes of awareness (the system of focus that will be discussed below) I am using it in a manner that is descriptive of the processes of mind in an experiential fashion. It is this active configuration of mind that builds the more static levels of mind. This relatively stable schema of mind acts as a network of paths for an active configuration of awareness which incorporates these same overall general dynamics inherent to mind. I call this active process, or dissipative structure, the system of focus and we will look at it more closely in the next section.

These three levels of hierarchic description also shape the characteristics of the systems that they organize. Within a given frame of reference or frame of focus, the system at the aggregate level is relatively closed. At the second level, or second order of structural hierarchy, the system is relatively homeostatic. At the functional level, the system as a whole is open and far from equilibrium. But any shift in the frame of reference, whether topologically defined or experientially focused,, can change the character of the systems involved.

In summary, this section has characterized the system of mind as a hierarchy of systems within systems. Furthermore, mind has been described in terms of three interrelated hierarchies that are useful in describing awareness from any orientation or frame of reference. The dynamic generation of the system of awareness is a product of the ecosystemic relationship of the organismic system and its environment. Thus the structures of awareness progress out of a somatic need to act upon and respond to the environment in more and more discrete or specific ways that come to be defined by the unique potentials of the organism.

Symbol Formation and Meaning

Needs and a Brief Look at Abraham Maslow

Since I will be referring to Maslow's two basic types of needs throughout the paper, I want to stop a moment and take a closer look at them before I take the liberty of adapting them to my own ends[2]. Maslow discusses motivation as a hierarchy of needs. The needs can be broken up into five ascending levels.

1. Physiological
2. Safety or security
3. Belongingness
4. Self-esteem
5. Self-actualization

Physiological needs subsume food, water, seeking of pleasure and avoidance of pain. These needs are essential to the biological integrity of the organism. Safety or security needs concern the organism's ability to find freedom from environmental threats and existential anxieties. Belongingnes and love needs reflect the fact that the organism must receive and be able to express trust and affection. Self-esteem reflects the need to feel competent, confident and adequate as an individual. And self-actualization, the highest need in Maslow's scheme, reflects the need to manifest as much of one's inner potential as one can.

Maslow further breaks these five needs down into two basic need types: deficiency needs (D-needs) and growth or becoming needs (B-needs). The deficiency needs are represented by the first two classes of needs presented above. They are biologically based and reflect the need to reduce some organismic tension. These kinds of needs can be characterized as homeostatic and they are the first to appear both ontogenetically and phylogenetically.

The becoming needs are represented by the last three or highest three classes of needs listed above and are basically psychological. They appear late, ontogenetically and phylogenetically, and create a sense of aspiration and the future. As the individual moves out of the D-need into a B-need orientation, he/she begins to develop aspirations more and more uniquely aligned with his or her own potentials. These needs can be characterized as open systems far from eqilibrium. They are tension producing, rather than tension reducing. Maslow states that these needs can be indefinitely postponed as the individual continues to focus on D-needs, but to contend that D-need considerations must be resolved before B-needs can arise, is untrue. The struggle out of a primary focus on D-needs to a focus on or through B-needs is a confusing and arduous process of separating out strands of each. Both types of needs exist comtemporaneously. My concern with B-needs and D-needs is epistomological. Maslow uses these terms in a broader sense.

Furthermore, in order to avoid the confusion that Maslow creates by using only two categories of needs, I want to introduce a third level of psychological description that embraces the other two. I will refer to this level of development as Self-actualization. I will be using the upper case "S" to distinguish it from Maslow's concept. Self-actualization, with the upper case "S" refers to what the Hindu thinkers call Atman. This level of description ultimately transcend the idea of needs, but as a teleological construct, it acts on the level of systems description and on the level of psychological description as the underlying organizing dynamic. This dynamic is created by the asymmetrical momentum of the psychic systems generated by D-needs and B-needs. Thus Self-actualization is not really a need but a compensation that is generated by needs themselves.

We will now look at these needs as motivations for the organism to interact with its environment and consider the general dynamics of their interaction on all three levels.

The Three Motivations and their Respective Strategies

The three levels of needs represent the motivations for the psychological development of the organism. These three motivations are always present in any activity directed toward the resolution of some need state, but the weight of each motivation depends upon the need state that is being addressed and the level of psychological development that the organism is operating through.

The first class of motivations and strategies is survival. The organism, as a biological system far from equilibrium, must act upon and exchange materials and information with its environment to maintain its integrity. The first class of motivations and strategies are based upon D-needs.

D-needs arise as various systems levels of the organism generate tensions of sustenance deficiencies. That is, as the balance of the system is threatened by some deficiency, the dysfunctioning of that system creates a general condition of tension in the organism. D-needs represent homeostatic motivations and strategies because the goal of the organism is to relieve those tensions.

The second class of motivations and strategies is self-actualization. At this stage the human being has necessarily begun the acquisition of a formal symbol system, for we are symbol making/dependent creatures. Through these symbol systems he or she differentiates aspects of the environment and creates strategies that reflect a more subtle resolution of D-needs. At the same time, he or she has begun to create the more unique areas of concern for the individual.

The power one gains from this aquired symbol system can be over-valued and directed toward selfish (D-needs) rather than self-actualizing (B-needs) concerns, but this leads into discussions of morality and that is beyond the scope of this paper. The strategy in self-actualization involves finding the possibilities available in the inherited socio-cultural institutions that offer the highest realization of one's unique blend of innate potentialities.

The strategies of the first class can be discribed as homeostatic or tension reducing. The strategies of the second class can be described as tension producing or as systems far from equilibrium. It is the aquisition of symbol systems that creates this asymmetry and shifts the homeostatic model of biological need reduction to a psychological model of systems far from equilibrium that carry an inherent drive toward growth and complexification. In terms of symbol systems, this drive is reflected in the act of more and more differentiation.

The third class of motivations and strategies is very different, but dependent upon the previous two. The primary difference lies in the fact that this third class is integrative rather than differentiating. The first class is primarily homeostatic, as already discussed, but even at this level, prior to the use of symbolizations, the organism begins to differentiate hedonic preferences. With the aquisition of symbols, the second class begins to differentiate more and more discrete levels of hedonic preference, on the one hand,

and generates a world view which also demands differentiation on the other.

The second class of motivations and strategies carry their own momentum which drives psycological development beyond the range of D-needs. Symbol systems create a world of relationships between the organism and the environment. Since we are embedded in this differentiating process, we identify with it and define ourselves in terms of it. Because of this identification, our self definition takes on the same character and quality of D-needs, i.e., we equate survival with the maintenance of this definition. And this is quite appropriate, at least developmentally. Without this life or death identification, our world views would be valueless. But this identification can also be our demise. If we are unable to shake this identification at the appropriate time, we will not be able to progress to the third class of strategies and motivations.

Once our D-needs are secure, and our socio-cultural inheritance acts to enhance this security, and once we have actualized our own unique potentialities within the socio-cultural possibilities offered us, then we are ready for Self-actualization. At this point, the limitiations of the models of description that one has acquired are seen in the light of one's own experiences. One begins to see oneself in definition and feels a sense of detachment and alienation. The experience of something larger than one's world view marks the stage of initiation. Eros has returned and the motivations and strategies of this stage reflect the need to integrate and experience one's ecosystemic relationship with one's environment in a more meaningful way.

In summary, D-needs and the acquisition of symbol systems set into motion the activities of differentiation. If there were no symbol systems available, as in the case of the infant, then the organism would operate at the level of hedonic preference. But given the fact that humans develop within a system of acquired symbol systems and rituals, differentiation develops to a highly specific form of interaction with an environment. But in finding its unique relationship to an environment, the human being also finds the limitations of its own uniqueness. At this point the individual seeks to find an experiential meaningfullness that transcends the limitations of differentiation. In fact, Self-actualization precedes the paths of differentiation and even posits the "world" into which these differentiations are set.

We will discuss these three classes of motivation and strategy in other forms below, but before moving on, it is important to note that these three classes are simultaneously directing the organism at all times. There may be a linearity in development in their predominance, but each registers its presence to some degree, even if only in potentiality.

Field of Evaluation

Within the characterization of the somatic matrix put forth here, there exists a field of evaluation that exists as the intersection of somatic dispositions and psychic manifestations. Operating through this field, and introducing distortions into this field are the activities of the sensory and motor systems. As a somatic need is manifested in the field, action is initiated to resolve the tension. The field of evaluation is the entire field of somatic tensions that give rise to the motor system. Each miniscule area of tension is a motor disposition of some organismic need or skill representation. As an infant and throughout the life of the organism, this generalized condition of the motor system is differentiated and focused in dynamic interaction with the sensory system through the creation of referents and symbolizations. This broadly defined range for the motor system helps explain how the intent of the organism can arise out of the somatic matrix into the realm of psychic representation.

Since psychological structures exist as open systems far from equalibrium in the field, they too can manifest needs. The intent of the organism operates through the two systems, i.e., the sensory and the motor. The resolution of this intent is the dynamic function of these two systems and occurs on one or both levels, that is, biological and/or psychic.

The sensory processes focus the motor skills and the motor skills focus the sensory processes. Each is a function of the other (cross- catalytic) and their interaction takes place in some medium. As the sensory and motor systems act in conjunction to focus intent, they may create a referent which repesents the difference in the expectation of intent and the resolution of intent. As a discrete element of the sensory system, the attempt to incorporate this slsment into the field through which intent is focused creates a tension that is evaluated as a morphological unit within a larger field of embeddedness and thereby informs intent.

For the infant, the actions of the care-taker set in motion the differentiation activities of the sensory-motor systems by supplying its needs. (We are also supplied with some innate dispositions toward action, e.g., the rooting response of the infant, which also set in motion these activities toward differentiation). As the child matures, the sensory-motor skills are differentiated and evaluated in terms of the care provided. That is, at some point, when a specific need arises, it is manifested as a configuration of sensory-motor activities that I call primordial symbol formations. The primordial symbol formations are totally embedded in the field of evaluation and reflect dispositions. The focus is the sensory-motor qualities themselves (or the organismic tensions) without reference beyond the field of evaluation. They represent the skillful development of coordinating sensory-motor activities among themselves and awareness is purely reactive. At the imaginal or protosymbolic level of awareness, the infant has learned to associate some specific activity with the need state.

The sensory system can be seen as a specialized aspect of the motor system or as its complement. The main difference between the systems is orientation. The motor system is activated from within and the sensory system is activated from without. The field of evaluation is embedded with sensory indices to motor skills that resolve organismic dispositions. These motor skills become dispositions in themselves and evolve into more differentiated needs that demand more and more discrete sensory indexing.

The interpenetration of the sensory and motor systems makes it difficult to separate them out conceptually to understand their relation to intent and the processess of mind. They not only inform one another instantaneously, they are already informed prior to intent and therefore present problems not only for conceptualization, but also evaluative determinations of relative truth and falsehood. A nice illustration of this fusion of the sensory and motor systems as a field is the mobius strip. The same surface that opens out is also facing in. Though different in orientation at any given tangent, the surface is infinite in its circularity and discrete in its closure.

The three fundamental systems of awareness arise out of the ecological interaction of the sensori-motor/affect tensions inherent to the organisms existential disposition and their activity within the environment. This relationship between the sensory and motor systems has been noted in the work of Humberto Maturana by Fischer (1981):

> Every change in activity in the motor domain of an organism, according to Maturana, triggers a change of activity in the sensory domain of the same organism and _vice versa_. The closure between the motor and sensory domains is realised through what the observer sees as the environment, yet this environment is only a means for closure. The observer stands in his descriptions in the very path of closure of the nervous system, between the sensory and motor domains of the organism, and from that perspective the nervous system appears to him as an open neuronal network. (p. 33)

Kock (1980) points out the same kind of relationship of the systems with the added point that the "material" of the configuration is always the same.

> All knowledge and meaning, and also all knowledge _of_ and _about_ knowledge and meaning, is thus computed _inside_ this permanent creative circle between "sensorium" and "motorium" of an organism and its environment. From the point of view of neurobiology the nervous system does indeed _compute_ what we experience from the (sometimes fragmentary and scant) "data" it receives. The fascinating thing is that these data are always of the same kind, namely uniform nerve impulses, [from] whichever sense organ[s]

> supplies them....(p.101)

This reflects the principle of undifferentiated encoding which in essence points to the fact that the discrete elements of awareness are only meaningful in terms of the pattern of relationship that they represent to the field of experience.

> The response of a nerve cell does not encode the physical nature of the agents that caused its response. Encoded is only "how much" at this point on my body, but not "what".(v. Foerster as quoted in Kock, 1980, p. 101)

The dynamic interaction of these systems are presented simultaneously within the somatic matrix and create a field of tension that is located in the field of evaluation as some aspect of it. The sensory constructs (which are made of the same "material", as just indicated, but presented as uniquely patterned elements to a motor continuum) of these need dispositons will be ultimately disclosed as the fundamental components of symbolization and cognition and represent specialized functions of the motor system. Affect will be the basis of evaluation and the emotional processes and is transmitted through tensions created by the sensory discontinuities embedded in the motor continuum.

The motor aspect of awareness, in its entirety, gives the field of evaluation a disposition in terms of mood or attitude. (Dispositions are also generated by the various sensory apparati by virtue of their embeddedness in the motor system). Since the somatic dispositions emerge as motor tensions, these motor tensions act in unison with the sensory system to generate hierarchies of skill representations. Thus the needs of the organism are met through the very system into which they are manifest. Through interaction with the sensory system in the processes of differentiation, the field of evaluation can be seen to be transported by the symbol formulations of differentiation.

The early work of Reich (1949) and later his student Lowen (1967) as well as Rolfe and the relaxation techniques that were in vogue a few years ago, are directed toward this area of attitudinal well-being. The motor qualities manifest at the imaginal level, for example, attain the status of what Polanyi calls skills in the sense that they are analog relationships to an activity or set of activities that are subsidarily presented in their performance. Polanyi (1966) cites the experiments of Lazarus and McCleary in 1949, in which a person is presented with a set of nonsense syllables, where upon the presentation of certain syllables is followed by an electric shock. After repeated exposure to the presentation, the subjects began anticipate the shock when presented with the "shock syllables", but they were unable to explain how they knew. This process of "subception" has the structure of a skill, according to Polyani, because "a skill combines elementary muscular acts which are not identifiable, to relations that we can not define"(p.8). (In fact all motor activities that are interactively involved with the sensory system can be called skills). If, however, these subceptions are left without further sensory differentiation (assuming that such a simplistic model can mimic real world relationships, like the development of self-esteem), and the organism continues to experience them, then an attitude emerges toward those nonsense syllables that becomes integral to any further exposure to those sylables and shapes subsequent relationships.

When I use the term sensori-motor/affect, the "hyphen" is used to separate the denotative or discrete functions of the sensory configurations from the anlog functions of the motor (with its skill and attitudinal aspect) and ("slash") affect (the value component) which is integral to the motor system. The fact that they are presented as a unit, however, points to their underlying unity and inter-penetration. Since I call the nexus of biological and psychological discriptions a "field" of evaluation, it will be helpful to explore some of the characteristics of fields and how they relate to this discussion.

In quantum field theory, the relationship between continuous and discontinuous realities is seen to be relative, rather than absolute. In the Tao of Physics, Capra (1975) states that

> The field is a continuum which is present everywhere in space and yet in its particle aspect has discontinuous, 'granular' structure. The two apparently contradictory concepts are thus unified and seen to be merely different aspects of the same reality. As always in a relativistic theory, the unification of the two opposite concepts takes place in a dynamic way: the two aspects of matter transform themselves endlessly into one another. (p.215)

(Space and time are the psychic manifestations of the sensory and motor constructions of "reality", respectively. The irresolvable conflict of discontinuities and continuities in quantum physics reflects the limits of an epistomology based on this underlying dialectic of differentiation). This description is only partially helpful, however, because it implies a subject-object relationship that places reality "out there" and reflects a highly developed denotative structuring. (Language itself contributes to the subject-object distinctions that make ecological characterizations difficult, if not impossible, since they transcend discursive formulation).

John Wheeler (1982) offers an anecdote to illustrate the idea of a participatory universe as opposed to a reality that exists "out there". He and a dozen friends decided to play a game of twenty questions after dinner one evening. The rules of the game were that the one chosen to leave the room must discover upon returning the word decided upon by the others using no more than twenty yes-no questions. When Wheeler's turn came, he noticed that he had spent an unusually long period of time outside of the room before he was finally allowed to return. He also noticed broad smiles on the faces of his friends and colleagues and felt suspicious of some trickery, but he went on and began to ask the usual questions. Is it mineral? animal? green? etc. As he went along, he noticed that it took his friends longer and longer to answer. Finally, after considering all the answers, he decided to ask if the word was "cloud", to which he was given a delayed, but affirmative response followed by an explosion of laughter.

As it turned out, his colleagues had decided to not agree on a word. They had decided that each respondent was to answer Wheeler's queries in any way that they chose so long as they could supply a word that would be compatible with all of the previous clues given. Comparing this anecdote with the observation of an electron in an experiment, he states that when he entered:

> I thought the room contained a definite word. In actuality the word was developed step by step through questions I raised, as the information about the electron is brought into being by the experiment that the observer chooses to make; that is, by the kind of registering equipment that he puts into place. Had I asked different questions or the same questions in a different order I would have ended up with a different word as the experimenter would have ended up with a different story for the doings of the electron. In the game, no word is a word until that word is promoted to reality by the choice of questions asked and answers given. In the real world of quantum physics, _no elementary phenomenon is a phenomenon until it is recorded phenomenon_. (pp. 21-22)

The point is that there is no preexistent reality "out there" until we create one. Objectivity is an act of consensus (with language as the most pervasive purveyor of this consensus). An inherent quality of symbol formation is the continual march toward objectivity, or the continual movement of symbolization out of the somatic matrix. As symbolization becomes more and more objective, their relationships are defined more by the extrapolated laws of relation and interaction than by the somatic field of evaluative interaction.

The field of evaluation is made up of interacting configurational potentialities that register digital/analog relations of the organism-environmental ecosystem. These interacting matrices, the sensori-motor/affective configurations, act as dissipative structures for processing the relational information about the ecosytem. The motor system (especially in the sense of "character armor" as described by Reich, 1949) tends to warp the field of evaluation in such a way that the sensory/affective configurations are stilted to some degree. (Though Reich was a student of Freud and his terminology is often couched in the framework of Psychoanalysis, his analysis of character structures is helpful in understanding how muscular armoring filters or censors the information processes of the senory and affective systems. Furthermore, this attitude generated by muscular armoring acts in a formal manner. " Character resistance is expressed not in terms of content but formally, in the way one typically behaves, in the manner in which one speaks, walks, and gestures; and in one's characteristic habits" (Reich, 1949,pp.51-52)).

The relationship of sensory indices to motor/affective analogs creates a hierarchy of fields within fields. Within the field of evaluation, or even within the sub-fields, are a number of sub-fields which in turn contain sub-fields. One can see that within the context of any field, the fields contained within it represent the discrete elements of tension that characterize that field. Thus the relative nature of discrete and analog.

System of Focus

The fundamental trait of all symbols is their focusing function. Of course, what is focusing in one context becomes representational at another. The three levels, sensori-motor/affective, imaginal and intellectual, represent the fundamental configuration of mind. But this static configuration of mind is reflected in the active system of focus whether somatically enclosed or acting "out" beyond the somatic matrix.

There is generally a movement out of the somatic matrix in terms of symbol formation or skillful activity and a movement toward the somatic matrix in terms of evaluation. This movement is performed by the vehicles (arc of intent and arc of resolve) of the system of focus. Symbol formation is the progressive psychic differentiation of the organisms ecological relationship with its environments while at the same time being more general and inclusive of other relevant more primary symbol formations. Evaluation is the simultaneous presentation of the discrete sensory elements of the referent (created through symbolization by the arc of intent that focused the activity) back into the motor field or some aspect of the field of evaluation.

Therefore, when the intent of the organism is directed toward the environment through some differentiated skill representation the evaluative function informs the organism of the value of that intent via the sensory index of the referent. The referent exists in potentiality as a index of resolve, frustration or ambiguation of that intent. Thus the sensory index of the referent has the potential to alter the symbolization, via integration, but the referent itself is not the symbolization.

Symbolization is a long-term psychic structure whereas the referent is a temporary template for focusing the arc of intent. The referent represents the difference between intent and resolve. It is the material exchanged by the open systems of the psyche with its environment. The adjustment set up by the referent in the system of focus may or may not become a permanent, integral adjustment to the focusing symbolization. Its effect depends on the resolution of intent.

But the referent is not a free floating datum that the mind hooks onto. It is the sensory qualities of a potential configurational enhancement embedded in a medium. The medium is a formal parameter and mediates the interaction of the vehicles, that is, the medium closes the gap between the arc of intent or symbol and the arc of resolve, or evaluation. It manifests the sensory-motor potentials for evaluative presentation and carries an inherent sensory bias of transmittal. (That is, the medium of light is a visual medium and the inherent motor disposition toward the sensory apparatus of vision is different, than say, the ears). It is the material through which the context or functional level of the hierarchical configuration via the vehicles is revealed.

The vehicle, which is bi-directional, i.e., somatic to social (symbolic) and social to somatic (evaluative), corresponds to the second-order hierarchical configuration that narrows the field of possibilities offered up by the medium and "describes" the relationships between the referents or objects that correspond to the first-order hierarchy. The referent is revealed as the sensory configurations in the medium. It is the referent that creates the gap and bridge in the related sensory-motor field. Without it we would be unable to make distinctions. The arc of intent is a focusing of the psychic processes through a skill representation or symbolization and the referent is the sensorily given configuration which the arc of resolve uses to shift the arc of intent. If there is a "match" or failure to force the focusing to a closer approximation, one is making a familiar ecosystemic interaction or else found resolution. (In this case, the act is more reflective and less perceptive). Otherwise the referent acts as a temporary tension in the vehicular field against which the arc of intent is refocused. These objects are acted upon in terms of the ecosystemic interactions and refers to aspects of that environment toward which the intent of the organism is directed. Intent, is of course, the overriding organizational dynamic because it directs the system of focus.

In Figure 3 the system of focus is seen in relationship with its context. The arrows pointing downward represent the direction of intent out of the somatic matrix. The arrows pointing upward, toward the somatic matrix, represent the direction of resolve. The circular configuration of the arrows at each level represents the progressive narrowing of intent and resolve as it is presented to the system of focus.

The context acts in a manner similar to the system of focus, but instead of acting upon a referent, it acts upon the vehicle of the system of focus. This context is treated in the same manner within a larger context. The idea of contexts within contexts is the same as the idea of fields within fields that arise as the symbol system becomes progressively differentiated and moves out of the somatic matrix.

(See Figure 3 in the Appendix)

The system of focus is some point of intent in the tree structure of differentiation. Therefore, the context can become the system of focus if it is not the whole field of evaluation. The field of evaluation is the ultimate context. The system of focus is a subsystem of its context which is a subsystem of a larger context, and so forth.

I have labelled the vehicles subsidiary and focal to show the relationship of this configuration to Polanyi's thought. But Polanyi fails to show the relationship of context within context to the whole system of mind. His terminology is useful here to show the "seeing through" quality of the levels of awareness, but it fails to make the distinctions necessary to show the hierarchical embeddedness of intent within the mind as a integrated whole.

The characteristics of the medium, e.g., the linearity of print, the analog quality of sound, as McLuhan (1964) has pointed out, shapes the dynamics of our sensory configurations (via referents). This dynamic of configurational asymmetry in conjunction with the vector dynamics of the field of evaluation draws the symbolic configuration out of the somatic matrix and gives it the character of an object, on the one hand, and a biased attitudinal focusing character on the other. Media, as an extension of the sensoru apparati, gives the symbol its syntactic meaning whereas the somatic matrix, the medium of somatic embeddedness lends the symbol its experiential meaning. The sensory qualities of the medium shift the manner of involvement and creates an asymmetry of attitude that lends symbol formations a quality of objectivity and rational organization. Without the limitations of a sensory bias, reflective awareness as we know it would not have developed.

The referent in dynamic interaction with the vehicles will generate the fundamental components of the hierarchical structures of symbolization and cognition, or the discrete aspects of mind through the arcs of intent and resolve. The vehicle is an interactive operation of the sensory and motor systems on a referent. The referent is acted upon as a function of intent and evaluated as a function of its sensory configuration. Thus all symbols are triadic. The referent is a virtual object of symbolic focus that rests in the tension of the vehicular field. It is this triadic quality that allows the symbol to be both transparent and opague, i.e. vehicle-like and object-like. The fact that it is a system far from equilibrium makes it mutable. When transparency occurs it represents a shift in focus where the aggregate elements of the symbol are focused upon (in thinking) or projected (in perception) and the analog character of the the symbol itself becomes the organizing "lens" through which the elements are seen. The shift in focus or intent from the representation to the vehicle (where the vehicle becomes the object) reflects a shift in the entire structure or system of focus, i.e., the structure does not expand or separate out. It is the ability of this system to move about almost imperceptively that creates the characteristics that are usually associated with thought and imagination.

The sensory processes contribute the discrete differentiation capabilities (within the formal constraints of the muscular armoring and sensory characteristics of the medium) to the ecological activity that generates the hierarchy of affective relationships, felt meanings and emotional processes as indices. As the biological system acts upon and is acted upon by the environment, the sensory systems register dissipative processes that are manifest as changes in the organism. These changes are "felt" as tensions in the motor system and are related to the activities of the particular system on its environment in terms of needs or a trajectory (symbolization) of needs that I call the arc of intent.

Simultaneous experience of the configurations of the sensori-motor/affective level of the ecological relationship manifests themselves psychically as images. Since those images are so closely related to the analog/continuum of "pure experience", we often confuse these configurations with "Reality" itself. I use the upper case "R" to distinguish the pre-reflective, ontological experience of the organism from the socially and culturally biased "reality" that we generate out of desires and needs via the media of our nurtured relationship with the world "out there".

The motor aspect of the symbol exists as an analog referent to the 'environment' whereas the sensory attributes of the referent (embedded in a medium) exist as a discreet subset of the analog relationship. Wilden (1980) defines the relationship of analog and digital for a given area of reference.

> Analog differences are differences of magnitude, frequency, distribution, pattern, organization, and the like. Digital differences are those such as can be coded into DISTINCTIONS and OPPOSITIONS, and for this, there must be discrete elements with well-defined boundaries. (p.169)

The establishment of boundaries is, in fact, how we are able to shape our experience of the ecosytem and communicate that experience, whether in a discrete (mathematical formula) or an analog (gestural) manner. The sensory qualities of the referent act as a figure on the vehicular ground. Wilden (1980) continues.

> Boundaries in fact are the conditions of all communication: the differential boundary of the figure and the ground is a primitive digitalization generating a distinction, and the distinction may then become an opposition. Figure and ground form a binary RELATION, one and two form a binary DISTINCTION, A and non-A in analytic logic form a binary OPPOSITION (an identity). 'Not' is a rule about how to make either/or distinctions themselves. The relation between presence and absence, for instance, is that of an analog difference. (p.186)

Evaluation is the affective analog configuration of the system of focus and is called the arc of resolve. The arc of resolve registers the satisfaction, frustration, or ambiguation of the system of focus that concludes the vehicular activity of some need. If the arc of intent is information feed-forward, the arc of resolve is the feedback. Therefore, until the information feed-forward (arc of intent) results in information feedback (arc of resolve) that is of a pragmatic concern (assuming the organism is faced with an existential demand), the organism will shift its system of focus, which reflects the "possibilizing" (a term I borrowed from Casey, 1976) activity of the system of awareness. The system of focus shifts about in this problem-solving manner until through successive approximations it has settled upon a resolution, whether satisfactory, frustrating or ambiguous, that is differentiated in terms of organ activities and organismic dispositions. This activity is paralleled in the context. Therefore perception, as well as the whole of the epistomological endeavor is an active, rather than passive, encounter.

I must be careful to point out that perception can begin in the arc of resolve when a symbolic configuration is presented, as for example, in a work of art. In this case, the artist focuses on the power of the referent by creating dislocations of expectations. These dislocations provoke evaluation and the arc of intent shifts about looking for a context and its intent. Hence the relationship between intent or context and the vehicle is reversed. In this case, the system of focus would be reactive rather than proactive and the act of possibilizing would be characterized as imaginative. This dual activity of possibilizing will be discussed in more detail in the section on explanation and presentation.

It is the inherent evaluative character of the motor-analog configuration and its hierarchical embeddedness in the somatic matrix or field of evaluation that contributes to the organisms meaningful relationship with and understanding of its environment. It is this kind of meaning, this first-order meaningfullness, which I refer to as the somatic meaning of the organisms integral embeddedness in the "world". It is the more abstract, symbolic derivations of this semantic base that is defined in terms of laws of syntax that I refer to as syntactical meaning. These two types of meaning somatic and syntactic, are relative, but in terms of vectors, the somatic is always directed toward the point of symbolic origins or the field of evaluation. The syntactic is always directed outward toward the more abstract and inclusive formation of symbols.

These cognitive elements that distort the field are relatively discrete, and discontinuous and therefore they are more objective (in the traditional occidental sense of the word) and less enclosed in the somatic matrix out of which they arose. But since they arose out of a somatic base, they maintain a kind of momentum (due to the reciprocal interactivity of the sensory and motor systems and their joint creation of referents) that is a carry over from their analog embeddedness and have a sense of causality or relationship that cannot be explained by the laws of an explicit logic.

It is important to note at this point, in case it was not clear before, that value is implicit in the very manifestation of a symbol. Symbol formation is a progressive differentiation out of the somatic matrix that refers initially to the relationship of the organismic system and the environment, not the "objects" of the environment, for objects are the manifestation of a higher level of differentiation. This higher level of differentiation tends toward discursive thought and the fundamental distinction of self-world/other is a bias that often clouds this understanding of the embeddednessd of values in symbol structures. Werner (1978) states that:

> [i]t must be emphasized again that the relation between the schematizing process and the articulated end form (the symbolic vehicle) is not a sequential one. The process of schematizing operates throughout, in a regulatory, directive way , on the inner organismic states as well as on the final (externalized) articulation; it directs all the mental

> operations involved in the formation of the symbolic vehicle, such as scanning, selecting, discarding, and sequentializing. It is the directed means-ends character of the schematizing activity that binds the vehicular form to its organismic matrix and gives meaning to the vehicular pattern. (p. 483)

Werner and Kaplan (1963) further note this symbol embeddedness when they state that:

> [i]t seems obvious that unless there were such vectorial-dynamic (organismic) patterns underlying the abstract, logical relations between thoughts, it would be impossible to relate 'because' or 'if-then' statements to lived experience. (p.442)

Wilden (1980) makes a similar case.

> A digital system is of a higher level of organization and therefore of a lower logical type than an analog system. The digital system has greater 'semiotic freedom', but it is ultimately governed by the rules of the analog relationship between systems. subsystems, and supersystems in nature. The analog (continuum) is a set which includes the digital (discontinuum) as a subset. (p. 189 in wilden)

By "semiotic freedom", Wilden is referring to the fact that as a symbol moves out of the somatic matrix, it loses its concrete, isomorphic, one-to-one correspondence to the sensory-motor-imaginal realm of the psyche and gains a more arbitrary, syntactic relationship to other syntactically determined symbols.

Analagously, "Einstein's field theory of gravitation and quantum field theory both show that particles cannot be separated from the space surrounding them. On the one hand, they determine the structure of that space, whilst on the other hand they cannot be regarded as isolated entities, but have to be seen as condensations of a continuous field which is present throughout space. In quantum field theory, this field is seen as the basis of all particles and of their mutual interactions" (capra,p.221-222). This is why I call the primordial base of mind the field of evaluation, because the sensory distortions (derived from action on referents) of the motor field are best seen as concentrated folds or knots which create uniquely configured affective analogs that act as discrete elements.

The rules we discover concerning the discrete (or more syntactic) kinds of knowledge carry a certain momentum of "ruleness" that can move them beyond a direct reference to the somatic or evaluative field. Symbolic-cognitive structures,however, must have an ecological relationship with some evaluative analog base to carry a sense of true or false. And this relationship is experiential (at least in the creation of the rules), that is, we feel into the affective analog (Polyani calls this "indwelling" and Gendlin calls it "felt sense") and compare the fit of the symbol or symbols, and decide if the configuration is appropriate. This fit is determined by the need which is manifested in the arc of intent.

The stability of mind and the framework out of which a sense of causality arises is due to the inertia of underlying clusters of somatic-semantic and/or symbolic-significant configurations. The configurations gain their relative inertia as an intrinsic function of their degree of interaction with the other structures of the psyche. That is, as the number of interactions increases for a system, or a cluster of systems, through the processes inherent to possibilizing, stability of that system increases in direct proportion to the amount of "traffic" it supports as a path of possibilizing. If the traffic is heavy, it becomes more descriptive to call that somatic/syntactic- system homeostatic rather than a system far from equilibrium.

This homeostatic configuration is called habituation in psychological literature. The traditional concern with the homunculus is seen here as the fabrication of discursive development where the habituations of interactions creates an Archimedian point of detachment. This fabrication is the reciprocal illusion of dualistic thought processes. In this case, the path of possibilizing has been rendered habitual and therefore the nodes of its transmission have become insensitive to the assaults of reorganization. The homunculus can be understood as the habituated intent or strategies of intent and represents the point of departure for self description, ego development and the path of security in an otherwise alienating development of dualistic understanding.

Our concern here, is to avoid matters of personality, behavioral compenations and pathological conditions arising out of the organic or nutured distortions (or both) of the organism, and to work within an ideal description of the processes of mind, but some mention should be made as to how these inclinations arise. The three major systems clusters corespond to the progressive differentiation/integration of the sensori-motor/affect interactions in the primordial field of evaluation. The interaction of these three areas and their ratio of involvement in the differentiation and integration processes determines the cognitive-emotive characteristics of the individual and finally the aesthetic dimensions of his or her symbolic,syntactic,semantic and affective needs. These clusters or constellations create, condition and shape the psychic spaces through which information is drawn and dissapated via the distinctions set up by the field of cluster interactions, into symbolic configurations that are compatible with the already existing morphogenetic dynamics. If, however, the information sets up perturbations that are beyond a certain threshold of dissapative resolution, then reorganization will occur on the level through which the information is organized or the system will collapse.

Thus the fundamental force of mind evolves out of a base of physiological needs, which in,itself, is not an uncommon idea. Langer (1967), for example, states a similar view, even though she does not specify, very clearly, what feelings are. "Feeling stands, in fact, in the midst of that vast biological field which lies between the lowliest organic activities and the rise of mind [and that] it is with the dawn of feeling that the domain of biology yields the less extensive, but still inestimably great domain of psychology"(p.32).

Rather than positing a dialectic configuration to these commensurate functions of mind, though aspects of these functions and their inter-/intra-systemic relationships can be described in terms of dialectics, I am suggesting that the functions can be best described as hierarchies of common origin that are superimposed, one upon the other, in a given frame of reference (i.e., fields within fields). These functions are emergents out of, or contained within, again depending on the frame of reference, the primordial field of evaluation and can be described in terms of open systems near or far from equilibrium. (I say near equilibrium because as the system gains more inertia, it tends to act in a manner most characterized by the homeostatic model). The field of evaluation is the undifferentiated, seamless web, "white noise" or the implicit orientation manifested by the continued existential integrity of the organismism itself. Need is the inherent force that drives the differentiation/integration processes. It is implicit in the act of awareness itself.

The functions superimposed on the field of evaluation operate somewhat in a figure/ground relationship, or dynamically translated, a differentiation/integration relationship, where each superimposition "emerges" out of the level logically prior to it as ridges arise out of the ground. That is at the edges, there is no real line of demarcation and the boundaries are ultimately fuzzy.

These superimpositions are offered up as a number of intermediate levels of organization because as Simon (1982) says," Complex systems will evolve from simple systems much more rapidly if there are stable intermediate forms than if there are are not" (p.209). As an example, he offers up a parable to explain the need of intermediate levels.

The story inolves two watchmakers named Hora and Tempus. Both of them were busy with work, but as Hora prospered, Tempus did not. The reason for Tempus' trouble was that everytime the phone rang he had to lay down the watch he was working on to answer it. As a consequence, the pieces of the watch came apart and he had to start over again each time after talking on the phone. As a result, the busier the phone was with new customers, the less work he could get done. Hora, on the other hand, had to build watches of equal complexity, but when he answered the phone, he did not have a problem to the same degree that Tempus did. Instead of building a watch from scratch each time, Hora broke the watch down into sub-assemblies. Therefore when he answered the phone, he only lost a portion of his work and did not have to start over completely. The moral of the story is that in order for a complex form to evolve, intermediate stages of development are necessary to increase the probability that the form will indeed come about. Rather than seeing this parable as a description of how the world presents itself to us, it is more useful to see it as the way we present the world to ourselves. Therefore, it is important conceptually to describe the development of mind in terms of levels of development to see how it is possible for mind to exist at all. This description also offers the possibility for a crude explanation of short and long-term memory.

Figure 4 represents the hierarchical interaction of the system of focus within the overall system of awareness or mind. As the arc of intent shapes a referent the arc of resolve registers that action and presents it to the context of the vehicles. The field of tension of the context is dynamically embedded within a larger context which is ultimately the field of evaluation. All fields are but aspects of the field of evaluation and carry a morphogenetic dynamic that imparts an immediacy of involvement without which the arc of intent would be a random event.

(See Figure 4 in the Appendix)

The referent is evaluated in terms of the resolution of intent and if transition from the initial state to the new state is possible then reorganization occurs. This in turn, as we have seen, may create a tension in the larger contextual field and the process of reorganization repeated at that level if the threshold of reorganization is reached. Since intent is change, a potential tension toward reorganization always exists in the very act of focusing.

If the context is the field of evaluation then the system of focus is still embedded in the somatic matrix and true discrete symbol formation does not occur. The referent in this case is embedded in the sensory-motor system itself and awareness is of the undifferentiated fluidity of the imaginal level of focus.

If you will recall, the analog aspect of any discrete symbolic configuration is built upon the simultaneous presentation of discrete elements that were once analog configurations themselves. Therefore the evaluation of any symbol will evoke its discrete constituents and shift the system of focus back a step. These constituents are related to one another through the vector dynamics of the analog motor skills.

Intent focuses through the motor analog or the vector dynamics of the skill representation or symbolic vehicle. It always acts upon the referent which is a more distinct category of analog skill and a potential symbolic adjustment. It always carries the potential for referent creation because it is an analog configuration far from equilibrium and the referent exists in potential as a perturbation toward complexification and growth. The referent as a discrete property of that analog field can be "postulated" to be the element that satisfies the intent of the focusing. Since intent is an act of focusing, a tension is already set up in the vehicle through which it focuses on the referent. The analog field is therefore already informed as to the kind of change needed in respect to further differentiation of the analog skill and the further inclusion of the referent.

The idea of focusing must be distinguished in two ways, i.e., reflection and perception. In reflection, the symbolic vehicle focuses our intent upon its constituents (analog vehicles that take on a quality of discreteness within the larger vehicular context) and the referent exists, not in the ecosystemic relationship of the organism and environment, but in the ecosystem of somatic and syntactic meanings. Reflection, therefore, becomes the primary source of symbol reification by virtue of its disregard of the organismic embeddedness. Reflection acts within the motor system and sets up sensory expectations.

Perception on the other hand, is primarily influenced by the sensory apparati and symbolic adjustments are made in terms of enviromental confrontations. Reflection allows us to test our strategies in simulated conditions, whereas perception forces us to confront our strategies under real conditions. Reflection directs us out of the somatic matrix by its abstracting activities on the symbol systems themselves while perception imbues ecosystemic qualities of organismic embeddedness into the same symbol system.

In summary, the relationship of the system of focus to the field of evaluation might best be discribed in this fashion. If the field of evaluation can be seen as a circle or sphere, then the system of focus can be seen to draw the field out to a point, thus giving the field of evaluation a tear-drop shape. The system of focus is not to be seen as a distinct and separate aspect of mind, but as an integral aspect of the field of evaluation. Just as the discrete constituents of the various fields inform one another, so do all aspects of the system of focus inform the field out of which it arises. Not only does every part inform every other part, the whole is inherently informing its constituents. It is this mutual reference of parts and whole that generates the dynamics of coherent change in awareness.

Somatic to Social Bridge

The final level of developmental differentiation involves getting the symbol out of the somatic matrix. Figure 5 represents the relative interpenetration of the somatic and social matrices. At any point across the continuum, the involvement of one matrix in expression is inversely proportional to the other. The vehicle of expression at the somatic extreme is gesture while language represents its complement. Werner and Kaplan (1963) sees the major means of promoting this process is through language acquisition. The bridge to language is vocalization.

> With development, the principle medium for representation becomes progressively differentiated from the persons immediate affective-motor-imaginal transactions with the world. Whereas the earlier media of representation are those of bodily movements and images-- only slightly differentiated in form from the the person's pragmatic activity-- the dominant medium for representation becomes that of vocal utterances, which are not central to the individual's direct, pragmatic operation on things. (p. 45)

(See Figure 5 in the Appendix)

The reason vocalization is crucial to the development of abstract thought is, to quote Werner and Kaplan again,:

> [b]ecause the medium of vocal utterances is both external (audible) to the symbolizer and relatively detached from actual commerce with things of the environment, this medium permits a considerable degree of functional specificity, conducive to representation per se and hence to the autonomy of the symbol.(Werner & Kaplan, 1963, p. 45)

Bruner (1966) goes on to elaborate that the level of differentiation beyond the imaginal is essential to conceptual thought.

> It is only when he can go beyond this "match by direct correspondence" that he comes to deal with such "nonsensory" ideas as the relations between quantities, invariance across transformations, and substitutability within a conceptual category. (p.29)

Vocalization represents the potential bridge (via language) out of the somatic and into the social matrix. It represents a medium in which the vehicles can operate and create referents. It is at this point that we can actualize our potentialities within the context of a much larger frame of possibilities.

The implication that htis characterization of the growth of mind holds for artificial intelligence (AI) is significant. First of all, the work bein done in AI involves the modeling of cognitive systems. The fact that computers have excelled in certain types of conitive functions is indisputable. But many areas of cognition have not fallen to this cognitive approach and its quest for computational speed and mammoth memories. The reasons for this lie in the methodology, as well as, in the character of the computers employed. The methodology is analytical and discursive. The computers are digital.

Until the computer is able to dynamically organize digital indices hierarchically across a continuum, AI will never incorporate experience and a sense of context into its operation. We will look at why this is important to AI and the ability of the computer to act as a medium in the following sections.

To summarize this section, awareness can be characterized as the progressive differentialtion and integration of symbolic and evaluative structures that operate in one sense to ensure the existential integrity of the manifest system, and in another way to direct that integrity toward a uniquely meaningful relationship with others in a social matrix. The three levels used to characterize awareness are not static, but reflect the dynamics of awareness implicit to any frame of reference. The characterization of awareness embedded in the somatic matrix (imaginal) represents the most basic frame of reference (prior to this there is no frame, only participation) and the ultimate medium of vehicular activities is the field of evaluation (the sensory-motor matrix). As the frame of reference moves out of the somatic medium (via vocalization, usually), the same three levels of description can be applied. The sense of continuity created by the movement of this frame of reference or the system of focus, and its almost imperceptible shifting, create the processes of possibilizing. As a pragmatic operation, the possibilizing activities inherent to the shifting of the system of awareness creates a coherent alternative to the trial and error tactics characteristic of the rat in a maze.

This possibilizing activity is important for symbol formation and will also be seen to be important for the creation and appreciation of works of art.

Aesthetics

Explanation and Presentation

As a rule of thumb, it might be emphasized that as evaluation becomes less experiential and diffuse and and meaning moves toward syntax, symbolization becomes more inclusive. As symbolization becomes more concrete and exclusive, meaning moves toward the somatic, experiential matrix and evaluation becomes more inclusive of the ecosystemic relationship. To further clarify this relationship of evaluation and symbolization, we need to take a look at the difference between explanation and presentation (See Figure 5).

(See Figure 6 in the Appendix)

Explanation is the act whereby one offers a formulation that directs the evaluative processes "back" toward an area of prior representation to enhance differentiation. Explanation has the quality of closure in that it tries to encapsulate (i.e., articulate) the meaning of its referent by setting up a context. It possibilizes referents or symbolizations via the felt meaning of the given formulation and trys to align them within a comprehensive field of syntax. This type of possibilizing is called problem-solving and it represents one type of creativity when it reaches resolution. The strategy of explanation is to divest the symbolization of its experiential, ambiguous qualities and to give it the qualities of an object or law. By making the experience detached and object-like, and hence seen within a syntactic context, the formulator gains power or control over it.

Presentation, on the other hand, is the act of offering an "incomplete" configuration that breaks or avoids the rules of syntactical expectations and requires an evaluation or simultaneous experiencing of the elements that constitute its lack of closure. This act prompts the evocation of seemingly unrelated classes of experiences. This type of possibilizing endows the experientially given configuration with meanings, if in fact a specific configuration is given (e.g., art works) which ties together and transforms the symbolic correlates of the previously disparate experiences. This type of possibilizing and creativity I call imagination. Possibilizing in this case acts as an opening up for fresh ecosystemic experiences.

One way to think about this possibilizing activity is to think about a collection of different sized bells. If you take a tuning fork and strike a tone, those bells with the same or the similar resonant frequencies will ring. In the case of explanation, a "context" of bells is given and and new bell is introduced to see if it resonates when the other bells are rung. In the case of presentation, a bell is rung and all similarly tuned bells in all contexts are heard in resonance. The drawing together of these bells in mutual resonance represents the creation of a new context. The more discretely tuned the bell(s) is the fewer number of variously tuned bells that will ring. The implications for the enhancement of creativity may involve the ability to make the focus of the possibilizing faculties somewhat diffuse intentionally. Thus when given a new felt meaning or a presentation, it sets up a resonance in the field of evaluation and the areas of similar configuration resonate and create an array of possibilities that the syntax of discrete elements will not allow. The system of focus is able to try out the structures of different contexts without the linear search problems associated with digital computers.

Creativity in the problem-solving approach has a stated objective or context whereas imagination is a problem, or more precisely, an experience that is "seeking" a context or form of presentation. Explanation offers a generalization and has a modular quality that allows it to be placed within the stated context. Presentation becomes a context for experience.

There is a difference in the methodologies of problem-solving and imagination. In problem-solving, one uses a array of intellectual and analytical tools in a narrowing down fashion to isolate the problem. In isolating the problem, the character of the solution is defined and those characteristics are addressed.

The use of AI in the form of expert systems has been useful in the area of problem-solving, but its applications are limited. The underlying limitation is associated with the fact that the context of the system is frozen. To overcome this limitation, the system must be, at least partially, self-referencing to enable it to expand beyond its initial limitations and "learn". To grow and learn, we have seen that it is necessary for the system to be open and asymmetrical.

The methodology of imagination, especially for the artist, carries with it an array of sensual techniques, whether self-nutured and/or acquired, that operate in an opening up fashion. That is, by virtue of being sensuous, they are experiential and thereby allusive. The artist, in an attempt to present an experience overlays these general technniques of sensual allusiveness in an effort to tease out the unique experience on which he or she is focusing. In the process, new techniques are often being developed. For example, the configuration for the new experience that is created becomes a new sensual device within some other context. This new technique, however, is not usually extracted right away because it requires a history of familiarity to be associated with a particular range of experiential qualities.

The use of AI for presentation is dismally rare and unsucessful. A system capable of presentation would probably have to be predominately analog. If, in some manner, digital indices could be presented to a continuum, and if the "weights" of meaning could be hierarchically configured within a larger continuum, AI might be able to create a presentation. The act of pulling together disparate meanings into a new manner of experience or a new idea would require that the system not only "understand" the context to which it addresses the idea, but also the qualities of human development. A system of this type seems, at this time, unimaginable. But with a network of profiles, which will be discussed in a subsequent section, some possibilities might be explored.

The generalizability of the problem-solved depends on the generalizability of its context. The generalizability of imagination depends upon the allusiveness of the context that it creates. But these two operations are not mutually exclusive. In terms of the vector dynamics of the system of focus, these two forms of expression (explanation and presentation) are achieved via the "mechanics" of the other. To create an explanation, an element of presentation or a context, must be available for scrutiny. On the other hand, to find expression in presentation, some syntactical formulation must be available in order to offer a meaningful rupture in the limitations of the formulation. In either case there is an ecological attempt to re-establish some relationship between the organism and environment whether that environment be syntactical or experiential.

In the case of explanation, the audience is asked to focus on the creator's expression of a system of focus. In presentation, the focus is on the creator's expression of a context. The aesthetic experience revolves around whether or not the audience experiences some organizational shift within their respective systems of focus.

For example, if someone offers you an explanation that ties together the loose ends of numerous other explanations that you were unable to combine into a simultaneous presentation to a field of evaluation, or vehicle of resolve, and hence creates a more inclusive domain of discrete understanding, then it has created an aesthetic experience for you. (Note that if you had found the explanation yourself via the imaginative faculty, you would experience simultaneously the flip side of the aesthetic experience, i.e., the creative experience. Note also that there is never one experience without to some extent also having the other. Since we are all uniquely configured, ultimately, the accomodation of someone else's insight still requires some alterations unique to our own possibilizing activities). The magnitude of the experience depends upon the reorganizing perturbations at one level affecting the thresholds of some contextual level. That is, if the reorganization at one level sets perturbations at the next level beyond a certain threshold, then reorganization is eminent at that level also. The usual response to this experience is "Eureka!" or "That's it". Gendlin (1962) calls this experience "comprehension".

In the case of presentation, the audience encounters a configuration that is incomplete in such a way as to direct the audience to experience it. This incompleteness, as mentioned above, is due to the unexpected turn of syntactical expectations. Russell's idea of logical types offers a simple way of lookin at this phenomena. That is, for objects in a class, say several types of dogs and the class itself, all kinds of dogs, the objects of the class and the class itself are of different logical types. Furthermore, the class cannot be a member of itself. In presentation, members of one logical type are usually combined in unexpected ways with members of another logical type thus creating unexpected relationships that break ordinary expectations. These relationships may be in the juxtaposition of different kinds of space, distortions of expected object proportions, circumlocution, mood and attitudinal shifts and so on.

This incompletness or aesthetic tension is usually the intended construction of an artist that offers a vehicle of possibilizing by virtue of it being the objectification of his/her field of resolve or evaluation of some pre-defined aspect of the ecological relationshp. It is oftentimes a distortion of an acquired vehicle of intent or explanation, but whatever its origin, its incompleteness invites evaluation and therefore becomes experiential. (Even the automatic drawings and paintings that attempt to by-pass the functions of explanation draw their strength from the very attempt to defy those functions). This experience may also occur without provocation while walking down the street or through a forest where we may sense a relationship that does not evoke a specific symbolization or coherent class of associations but rather beckons us to accept the unstated experience itself. Whether or not the experience reaches closure, that is symbolic formulation or expression, is not necessary to the experience of possibilizing (or the experiential opening up of the aesthetic experience) itself. The experience itself, fleeting as it seems upon reflection, was referred to by the "Sixties" crowd with the slogan "Be Here Now". But while these experiences may be provoked without explicit intent, it is usually the artists among us that manage to find these experiential formulations and present them for the conscious intention of possibilizing. (Gendlin (1962) calls this circumlocution).

If these presentations can be appreciated, that is possibilized, (where felt meanings evoke new classes of experience), the activity itself creates an experience or sense of relationship that was not present before and may be felt as a belongingness or estrangement depending on the dispostion of the individual. Thus the aesthetic experience of presentation creates a need for or desire for closure that may or may not be immediately forthcoming. The need for further symbolization and the experience of possibilizing creates simultaneous presentations which may or may not be synthesized into new and useful formulations. This all depends on the disposition and/or ability of the individual. The aesthetic enjoyment that many people find with a presentation is the sense of relatedness between or among meanings that the experience evokes. That is, the experience of tangential meanings, the touching and turning of these meanings within the light of each other and all together at once, makes the presentation enjoyable in itself. If the experience provokes one to find explanations or produce new presentations, that is all fine and good, but those are activities subsequent to the experience offered in the presentation.

Heidegger, according to Kocklemans (1984), makes a similar case when he makes the distinction between "thinking" and "poetizing".

> The basic characteristic of poetizing consists in bringing Being into words in a truly originating manner; that constitutes the "creative" element in poetizing, which envisions and institutes a "new" world, i.e., a world with new options and possibilities. In this case, the human response thus tries to bring into words as carefully as possible the "dictation" of Being itself. In the final analysis, the twofold poetizing saying institutes..., brings about..., and founds what remains, i.e., Being. It also "determines" what a human being is, what a people is, because it "determines" in what world they will live. (p.206)

Heidegger's use of Being points to the ground on which the ecosystemic relationship is developed, or the field of evaluation. The idea of beings, b in the lower case, refers to the manifestations or "dictations" of that ground in terms of the ecosystemic relationship.

Kocklemans (1984), goes on to summarize what

Heidgegger calls the thinker.

> However, in the second type of response, one can also realize that every articulation of the meaning of Being in any given world is inherently affected by negativity during each epoch of its history, so that everything said and thought, including the aboriginal saying of Being, and most certainly man's response, contains something unsaid and something still unthought. This phenomena is to be brought to light by thinking. Thus the basic characteristic of the thinking act consists in returning to what is already said and thought (which, as far as every original response is concerned, presupposes poetizing), in order to think again the unsaid and unthought in what has been so said and thought. The poetic saying is oriented primarily toward what is to come, something novel, something which as such has never been. The thinking saying is oriented primarily toward what has already been said and toward what is to come only through the dialogue with the "poets". (p.206)

The negativity of history refers to the given set of communicative vehicles of meaning available within the social-cultural matrix at any given time. That is, whether the articulation of meaning is the work of the artist or of the thinker, the manner in which poetizing and thinking reaches expression is conditioned by the inherited vehicles of expression. The idea that thinking presupposes poetizing is reflected in explanation and presentation, but at some point it becomes necessary to realize that ontogenetically, they must develop simultaneously as complements. As I pointed out above, presentation is also dependent upon explanation in order to create some kind of dislocation in syntax. The fact that we can distinguish these processes reflects the fact that as the system of focus becomes more highly developed, the functions of that system begin to stand out in the differentiating processes of awareness. The underdeveloped or immature system of focus is embedded in these processes and awareness can be characterised as more "magical". Aesthetics is therefore a function of epistomology. If we did not engage in world-making, aesthetics would not be an issue.

The general dynamics of the aesthetic experience can only be understood in terms of open systems far from equilibrium. As pointed out above, the closer to equilibrium the system is, the harder it is to break its inertia or stability. (Since the discrete areas of tension within the field have different weights by virtue of the acquired dispositions of integrity manifested within the social milieu, and the characterological dispositions which filter out experiential possibilities, aesthetic experience is uniquely configured for all of us.

But since we do exist within a socio-cultural construction, there tends to be some generalizable aesthetic tensions that we can all share). Explanation generates tensions in the field of evaluation, or the affective field most closely allied to the symbolizations in question by introducing the need for realignments of discrete elements in an old field formation. Presentation generates tensions (forms) between the discrete symbolizations (content) of the aesthetic field and provokes the creation of new symbolizations in new psychic fields.

The act of creation, whether offered up as presentation or explanation involves both processes of possibilizing just as the act of appreciation does. The fundamental difference between the creative and appreciative act is intent. In the creative act of explanation, the author is seeking closure, a symbolic vehicle or system of vehicles for anyone using the same syntax to act through. For the author of presentation, the intent is to offer a context, an experiential vehicle of possibilizing symbol formations and relationships in a more unique or individual fashion. For the audience of the presentation, the point of departure is evaluation and which is characteristically passive. For the audience of the explanation, the point of departure is symbol alignment or syntax and directed activity that is generalizable.

In summary, explanation offers referents or referent building techniques, whereas presentation offers the sensual qualities of referents for evaluation. To say that explanation and presentation are exclusive would be a mistake. Each sets up the other and the distinctions I have drawn are for conceptual purposes.

The Divine and Not So Divine Proportion

Aesthetics, in a sense, involves finding a common thread (whether experientially or syntactically) that relates or brings together apparently disparate areas of concern. As shown above, the aesthetics of presentation requires that the audience experience the meanings of the aesthetic configuration simultaneously, thus creating a new field of experience. The experience of the various meanings is reorganized into a new level of meaningful experience. The aesthetics of explanation is experienced when the audience draws together previously disparate explanations into the more comprehensive explanation that they are shown. But what is it that provokes this reorganizational shift and makes it feel more right and elegant than another one that is probably equally valid. This is the question that I want to address at this time.

Huntley (1970) argues that aesthetic preferences can be accounted for by the mathematical proportions that we find in nature. The aesthetic preference for a golden rectangle, for example, is related to our instinctive sense of the interval, he speculates that:

> [h]owever complex physiologically the act of seeing an object might be, the estimation by the eye of the relative lengths of the adjacent sides of the [golden] rectangle is ultimately reducible to the instinctive measurement of the relative duration of two *time intervals*.... In this way the experience of a *space interval* is reduced to the more immediate experience of a *time interval*. (*pp*. *52*-*53*)

Huntley further states that:

> [i]t is in accord with observation and experiment that the musical interval that gives the greatest satisfaction to the greatest number is the *major sixth*, frequency ratio 8:5, approximately. This corresponds to the pleasure experienced in seeing the golden rectangle, the adjacent sides of which are in the ratio [*Phi*: 1], which is approximately equal to 8:5. (p. 55)

Lawler (1978) in an article on Cistercian architecture and sacred space carries the connections between the aural and visual into the context of mystical facilitation.

> In a general way, through vision we take in images coming from an apparently external world. The mind reacts through instinct, habit, memory, association, calculation or reason. But with hearing, sound creates an instantaneous (and mathematically precise) recognition of a tone, without the intervention of mind. At the same time this sound may touch and connect regions of higher emotion and mindless knowing. (p. 16)

Lawler argues that the incorporation of the golden section into the proportions of Cistercian architecture contributes to an acoustic quality that lends itself to conditions conducive to meditation. Upon experiencing the acoustics at the Abbey of Thornton, Lawlor recalls reading an article in Scientific American.

> Sound reflected by the walls of a sphere caused strong resonations in the whole body -- the skull, thorax, abdomen and bones all vibrated together -- and produced the sensation that all sounds came from within the body. Even if one remained totally passive, the body continued to respond actively to the sound. (p. 13)

Thus the golden ratio is not only an intellectual construct, but an ecosystemic proportion that can be experienced.

The five Platonic solids are the only regular convex solids that can be circumscribed by the sphere. The ratio of the circumcircle, for example, of a regular decagon to its side is the golden ratio, or Phi. The divine proportion, as Kepler called it, is related to the figure as it is embedded within its circumcircle or sphere. This creates an interesting parallel because the sphere and circle have been traditionally associated with wholeness (e.g., mandala, ouroboris, cycles of nature or the seasons, wheel of life, etc.). The suggestion that I want to make is that the relationship of certain configurations to the whole, as reflected by the idea of divine proportions, may also reflect a relationship of the fields within fields of sensory-motor configurations to the field of evaluation.

If the field of evaluation is seen as a sphere or "whole" and the sensory-motor configurations as indices to the respective affective fields which are hierarchically configured "parts", then the relation of the parts to the whole may be thought of as having a relationship that can be understood in terms of the divine proportion. The implication is that the relationship of part to whole may be universally reflected in the divine proportion. Furthermore, given that this is the case, any given frame of reference will also display this relationship locally. Thus the system of focus can carry its own quality of wholeness that is distorting within the larger framework of mind, but aesthetically pleasing within the given context. Furthermore, if the reorganizational shift a the local level is reflected at a more inclusive level, a tendency toward wholeness could be seen as an underlying teleological dynamic. This would account for the fact that some configurations are more elegant than others.

But before pursuing that speculation, let us try another one that may seem even more fantastic. I think that Huntley's (1970) speculation that we learned the preferred interval of 8:5, for example from the birds is clearly off base. I suspect, however, that within the range of our senses (for it is a well known fact that sound frequencies and light waves can be discribed beyond the limits of our perceptual capabilities), proportions can be set up within that range that reflects the relationship of part to whole. The fact that there are five regular solids and five organs of sense reflects another interesting, though non-conclusive, parallel.

The point that I am trying to make is that given that the field of evaluation represents the "whole" potential of the organism, and furthermore that the sensory-motor concentrations within that field are asymetrically arranged possibilities (i.e., systems far from equilibrium) of that fields manifestation, then those configurations within the field that relate to the whole as "divine proportions" are felt as more "satisfying".

And the depth of that satisfaction is related to the extent that the fluctuations set up at one point reflect a more harmonious integration into the whole. Another point I am trying to make is that "wholes" are relative.

Thus the less elegant aesthetic possibility would reflect a local reorganizational shift that would drive the asymmetrical character of that locality into closer alignment with the overall tensions of the larger context. In a lesser way, it sets up the increased potential for realigning the larger context within its larger domain. The greater more elegant aesthetic possibility would create much larger realignments and hence be more directly related to the whole.

The idea of realignment of part to whole in terms of the divine proportion seems eticing on an intuitive level, but how would it be implemented in artificial intelligence. How can imaginal qualities be reduced to numerical discriptions in a field. This, in itself, seems surmountable when one thinks of shape proportions, light intensities, sound intervals and so on. But the selection of the content in terms of some over-riding idea and finding its proportions in relation to that idea still seems elusive.

In a dynamic sense, the relationship of part to whole represents the drive of the systems to find harmonious compatibility within the field of evaluation and to manifest the unique potentialities of that field through the vehicles of possibility available. On a psychological level of description, this represents self-actualization.

The implication of this description is that at some point, assuming that a harmony is achieved, the evolutionary model of systems far from equilibrium is displaced by a homeostatic one. That is, becoming is now Being and self-actualization is now Self-actualization.

The implication for AI seems to point to a self-actualizing system. If the system is purely autopoietic, this would indeed be the whole story, but how would this system be able to speak to the needs and aspirations of the human system. In this endeavor it would fail and for this reason it is important that the system be only partially self-referencing.

The next two sub-sections will focus on this psychological shift. That is, given that the potential of the organism is seen as a primordial wholeness, we will look at its manifestation of this potential within the vehicles of possibility offered by the social-cultural matrix in which it becomes immersed. We will also consider how, once the organism is enmeshed in these configurations, it is finally able to transcend them.

Levels of Experience

Since I have not focused upon other experiences of ecosystemic relationship, I must digress here and place the aesthetic experience within a larger context. The two other experiences of relationship that I want to discuss are the sensual and mystical or contemplative experience.

The sensual experience can be exemplified in the sexual act which is mediated at its most fundamental level, as everyone is aware, by the sensory and motor systems of lovers in direct physical contact. The physical union is primarily directed toward the release of biologically based sexual tensions of the organism. The selection of a lover, in the best sense, is an affirmation of one's ideals about a relationship and self. The meaningfullness of the ideals may be experienced aesthetically as they are projected into or made manifest by the significant other. If in the act of love-making, one further experiences the coupling as a release from the bondages of worldmaking, then one has what can be described as a mystical or contemplative experience. (The tantric sexual techniques offer a formalized possibility for this latter experience).

The act of love-making is probably experienced as physical pleasure more often than not, as aesthetic pleasure even less so, and as a contemplative experience very rarely. But the act of love-making offers a convenient illustration of the three degrees of meaningful relationship.

The physical experience of feeling good or bad illustrates the purely hedonic level of experience. It is available to all and we are continually bombarded with its exploitation in every area of advertising. It clearly reflects the experience of D-needs. The aesthetic experience is available to those who are trying to find some unique eco-relationship with the world (self-actualization). The degree to which they are open to finding this relationship is probably reflected in the number of significant aesthetic experiences that they have. This level of experience reflects the experience of B-needs. The mystical or contemplative experience is far less common than the previous two and is even attributed to the other two. But the experience at this level is beyond needs and the dualistic filtering of experience that needs engender. The successive experiences are inclusive of those prior to it, but the transition from one to the other is not necessarily linear.

The sensual experience finds meaning in the biological domain of existence itself. It has the potential of mystical union in that it is related to the ground out of which existence is generated. It is, however, often meaningful purely as the physical release of tensions built up in the organism and can be seen as affirmation of the organism itself.

The aesthetic experience is self affirming and actualizing. The experience of the possibilizing functions of the imagination render a unique blend of meanings that are extremely personal, but fertile for the development of new expression and explanations. It contributes to the ontogenetic or historical meaning of existence in uniquely self affirmative ways. But this is the Buddhist "world of suffering and attachment" that must be seen for its transitory and impermanent nature. Rilke (1939) laments this condition when he writes:

> Who's turned us round like this, so that we always,
> do what we may, retain the attitude
> of someone who's departing? Just as he,
> on the last hill, that shows him all his valley
> for the last time, will turn and stop and linger,
> we live our lives, for ever taking leave. (p. 71)

The contemplative experience is meaningful in that it is ontological. It is the experience of transcending the needs and dualities of existence and gaining a pure relatedness with the source of being itself. Lao Tzu (1961) in the *Tao Te Ching* describes the relationship of the ontological and existential (epistomological) in this manner:

As the origin of heaven-and-earth,
/it is nameless:
As "the Mother" of all things,
/it is namable.

So, as ever hidden, we should look
/at its inner essence:
As always manifest, we should look
/at its outer aspects.

These two flow from the same source,
/though differently named;
And both are called mysteries.

The Mystery of mysteries is the door of all essence.
(p. 3)

The aesthetic experience is a sub-species of the mystical experience. It is the self-actualization (becoming or attaining) of Self(Atman)-actualization or Being. Chung-yuan (1963) points to this relationship when he states that "[t]he ordinary man [or woman] may enjoy the qualitative harmony of forms and colors, but he [she] does not behold the reality within all things. He [she] may see the beauty of appearances, but he [she] fails to perceive the origin of all beauty, which is not beautiful of itself"(p. 170). Chuang Tzu offers sympathy for us in this appreciation we maintain for the world we make, but he advises us to dispense with world-making in order to experience the source of our appreciation.

> The fishing net is used to catch fish. Let us take the fish and forget the net. The snare is used to catch hares. Let us take the hare and forget the snare. The word is used to convey ideas. When ideas are apprehended, let us forget the words. How delightful to be able to talk with such a man, who has forgotten the words! (quoted in Chung-yuan, 1963, pp.43-44)

Many artists do not work beyond the aesthetic level, but their work is essential. The aesthetic experience evokes the uniquenesses of its audience and helps to focus their B-needs. It is only by coming to create and develop this uniquenes that one can come to dispense with the nets and snares that one has created and been shown. Aesthetics is the bridge beyond self definition that sets up a balanced and meaningful experiential base for Self-actualization.

Implicit to this discussion is the notion that there is some inherent "drive" toward a higher or mystical union. This drive is given implicit as well as explicit lip service in the humanistic and transpersonal psychologies and in the wealth of literature inherited from the teachings of the East. This drive represents the compensatory need generated by the alienating effects of the epistomological processes of world-making (and the asymmetrical dynamics of systems, as mentioned in the previous section) and is reflected in aesthetic activity. The search for a more meaningful relationship with the ecological embeddedness that we destroyed in the process of world-making (the tasks of Psyche) not only drives us to refine our definitions of self, but also to transcend them. This trancendance occurs when we see the limitations of all definition and experience those limitations simultaneously as our own uniqueness.

> Last night the spring rains came rushing to the river.
> Today the huge ships float like clouds upon the stream.
> Vessels that could not stir before
> Now travel freely in the middle of the current.
> (Chung-yuan, 1963,p.58)

Social Dimensions of Experience

The sensual, aesthetic and contemplative experience reflect the development of individual awareness. But awareness does not develop outside of the social matrix. In Figure 6 I show these stages of individual awareness within the context of social development. I call the three stages of social development the archetypal, the mythological and the individuating.

(See Figure 7 in the Appendix)

Archetypes are the meta-context of ecosytemic interactions. Their particular axiomatic character is reflected at the mythological level, but as pure potentiality, the archetypal level precedes all consensus or formulation and represents a pre-symbolic stage of development. The archetypal level is the tendency of the organism as manifest in psyche, as a system far from equilibrium, to maintain its integrity. As a species with a history and hence a memory of successful strategies of adaptation, we can organize the amorphous qualities of this pure potentiality into mythologies that offer paradigms for living in and acting upon our environments. Given that the system generates preferences, we can speculate, via the reduction of mythologies as to what these archetypes are. But the biases inherent to the methodologies of reduction within the perspectives by which they are defined can only fail if for no other reason than the fact that they will be tautalogical.

At the individuation level of social development, the individual sifts through the inherited mythological organizations in which he or she is immersed to find those elements which apply to his or her own unique potentialities. That is, given that the individual is conditioned by an inherited set of mythologems, one seeks to exploit one's native talents within the context of social possibilities and actualize one's genetic endowments.

Each and everyone of us is uniquely endowed at birth and within any given social-cultural milieu and given the opportunity (i.e., all pathogenetic and political constraints aside) we will strive to express those potentialities through the synthesis of various mythological vehicles. Therefore, as each of us encounters the mythologies of our possibility, we consciously or unconsciously choose and weigh some of them and their archetypes differently than others. In this way we are setting into operation the actualization of our unique potentialities within a historical context and creating ourselves as unique individuals.

The levels of development referred to in Figure 7 represent the intersection of individual potential within the given social possibilities. This chart does not represent a linear developmental path, but rather areas of simultaneous, yet differently weighted manifestations of developmental expression. The best way to look at this chart is in terms of the shot pattern or spread of a shotgun. Most of the pellets will probably be concentrated at some area in the chart, but some of the pellets will strike all of the areas. (A point to remember, however, is that the pattern is fluid).

Briefly, the descriptions of the nine intersecting levels of individual potential and social possiblity are:

Sensual/archetypal- This is the seed level of pure potential and total dependency upon a provider.

Sensual/mythological- This represents the innate biological disposition toward species propagation and reflects even more the need for intimate association with others. Whereas sex is usually associated with this stage as the organism develops, and rightly so, the need for intimacy, in whatever form it takes, is psychogenetically prior to species propagation.

Sensual/individuation- This is the level that the individual becomes involved in child care or the care for others in the sense that he or she must recognize their needs via some form of empathy and mutual understanding. The care provider must search within him or herself to find an appreciation of the specific need. One also begins finding and imposing one's own hedonic or sensual preferences.

Aesthetic/archetypal- This is the seed level of potential which has been channeled through some form of the previous nurturance into an encounter with formal symbolization. At this stage the individual begins to operate within the inherited institutions of the culture.

Aesthetic/mythological- At this stage the individual is fully immersed in the inherited structures of the society. This represents the level of opinion and the point at which differentiation becomes a serious matter.

Aesthetic/indivduation- At this level of development, the individual is refining the mythological structures that he or she has acquired to reflect the more unique aspects of one's own sense of self. Self actualization in any real sense begins here.

Contemplative/archetypal- At this intersection, the individual senses the limitations of differentiation and begins to shift the focus of awareness toward the more experiential, evaluative side of the system of focus. This is referred to as initiation in the introduction.

Contemplative/mythological- This intersection represents the attempt of the individual to formulate techniques or tailor the adopted ones to focus the evaluative and experiential avenues of awareness. One may be able to do this oneself, but usually one finds a spiritual guide. There are basically two approaches which will be briefly discussed in the next sub-section.

Contemplative/indivduation- This is the level about which little can be directly stated. experientially, it is most like the seed stage, but it transcends them all. This is the reason that it is detached from the rest of the chart. It is the somatic endowment that permits us to recognize the limitations of the social inheritance, while at the same time it is the social matrix that serves to direct and make manifest what was organismically only potential. Just as an open system far from equilibrium fluctuates and reorganizes or transcends its prior ecosystemic relationship, so does the Self manifest itself out of the self of becoming. This is the level at which all art, science, knowledge, emotions, or rather, all conditioned knowing is seen as limitation. There is no longer a personal need for or identification with it.

Thus the three major stages of psychological circular development can be seen as a progression from a sensual immersion within the fluidity of Being, to the differentiation imparted by the need to survive around to the need to re-establish union with the fluidity of Being. This progression is not necessarily a progression through intellectuality, but some differentiating structure must develop.

The aesthetic level represents the stage of differentiation and integration, but these processes may be reflected in skillful activities and work. In the Hindu world, this would be the path of Karma yoga. The way of the intellect is called Jnana yoga. The ways of devotion and meditative technique are Bhakti and Raja yoga, respectively. The point is that it is not the manner of structuring that is important but the fact that structuring must occur. Without it we would not be able to actualize ourselves and create a vehicle of transcendance. In the next section we will look at the two principle ways by which we reach this transcendance.

The Two Paths

There is a reflection of the creative, ontogenetic processes of explanation and presentation in the mystical and religious traditions. "According to Taoism there are two routes leading to enlightenment, ming or ontological insight, ching or quiesence" (Chung-yuan, p.123). The polemic over the merits of "sudden enlightenment" (especially the Southern branch of Chinese Zen Buddhism) and the study of scriptures became a branching point in the history of Buddhism. In the Western traditions, these two ways are referred to as the apophatic and the cataphatic approaches.

The cataphatic approach is the way of affirmation, the act of giving God attributes which are usually of human qualities. The apophatic approach is negative, or the via negativa of St. Thomas Aquinas. This method denies any attributes of God and points to the inability of intellect to know God. Maritain writes:

> It is clear that apophatic theology, which knows God by the mode of negation or ignorance, knows him better than cataphatic theology, which proceeds by affirmation and science. (as quoted in Moore & Moore, 1984, p.3)

The concepts of explanation and presentation that I have developed here share much of the same tenor and directiveness of these two concepts, but the range or scope of explanation and presentation is operative in the domain of epistomolgy rather than in trans-epistomology or metaphysics. But this is a difference of degree.

The fact that the negative approach gets better "press" than the other, probably reflects a preference of personality or a preference for austerity rather than a characterization of some absolute truth. If one creates the needed structures for actualization by giving God attributes, then that is the path they have chosen. If someone else structures experience in some other fashion, then the need to work with attributes would seem far less of a necessity.

Thus, in summary, we have seen that the sexual embrace can be used to represent the three forms of meaningfulness (*re*-*ligio*) available to human experience. On the sensual, biological level, the experience affirms the cycle of species continuity as reflected in the somatic matrix. At the aesthetic, ontogenetic level of experience, the continuity and cycle of history and the social matrix is affirmed more or less uniquely to the individual. And at the contemplative, ontological level, we experience the pure potentiality of Being itself and the limitations of existence through a return to the source of ontogenesis. Thus the cycle of sensuality lies within the cycle of history which is embedded in the uroboric cycle of Being. Eliot (1971) writes of this embeddedness of becoming in Being in *The Four Quartets*.

> We shall not cease from exploration
> And the end of all our exploring
> Will be to arrive where we started
> And know the place for the first time.
> (p. 59)

The Exosomatic Extension of the Vehicles

Tools, Machines and Automata

In the Stanley Kubrick film of Aurthur C. Clarke's 2001: A Space Odessey, we see, in the opening scenes, a group of hominids on the threshold of a discovery. One of the hominids has taken up a bone and realized that it can be used as a club to smash things and, as an extension, to defeat and drive away other hominids. Upon realizing the potential of the club, the hominid flings the club up into the air. As it spins up higher and higher we watch it become tranformed into an orbiting weapons platform. Later on, you will recall (for those of you familiar with the film), we are introduced to the HAL 9000 series computer around which the rest of the story revolves (or devolves).

One theme that can be drawn from this film involves the relationship of humankind to its technology (though in this example, the more ominous parallels are being drawn). From the tool to the machine to the automaton, we can see how technology weaves itself in to the very fabric of our existence.

As above, when the hominid uses the bone as a club and smashes the skeleton and then drives away the intruders, the tool becomes the direct extension of the body or the motor system of the user and finds its direction into the social matrix. But the use of tools also extends the processes of mind as Wilden (1980) notes.

> Tools are artefacts, but they are not in essence objects. Since they qualitatively increase a species' possibility of organizing and controlling the matter-energy in the ecosystem, their primary characteristic is that of information. They are forms which inform; they are informed because they remember the past and make possible new types of projection into the future. Tools were perhaps the first properly 'discrete' signs ever employed by what was later to become man-and-womankind. (p.363)

The tool amplifies and enhances some activity on the environment and offers new ways of addressing that environment. But the tool user must still supply the skill or rules to the activity.

The machine objectifies intent by incorporating the the rules of tool use into the "tool" itself. That is, the machine objectifies the extensions of the sensory and motor systems in some predetermined way to act on the environment. The machine builder has only to decide what specific domain of activity he/she wants to address. (The orbiting weapons platform can be seen as representative of this function). But within the context of a larger process, the machine as a whole can be seen as a tool.

The automaton is the fully objectified processes of the sensory and motor systems, or some aspect of it, that embody the rules of operation in only a partially predetermined way. The ideal automaton is unique in that it can refine and/or redefine the original rules and adapt them to novel situations. An early example of this on a relatively crude level is W. Grey Walter's *Machina speculatrix* or "tortoise".

The area of automata has previously included devices that mimic the activities of humans and animals, whether physically or mentally, but these devices are usually machines that are used theatrically in order to create an illusion rather than in the way that I am describing automata. A brief summary of some of these devices is presented in a paper by Csuri(1977) on computer art, as well as in Walter (1970). The modern day calculator also mimics the calculation powers of the human mind, but it is still dependent on the intent of its user and is usually seen as a tool or machine.

But at any given point, the progression of technology can be seen as the progressive objectification or the isomorphic movement out of the somatic to exosomatic realm of the vehicles of the system of focus.

The last domain of intent to be incorporated into these exosomatic extensions is the vehicle of resolve or evaluation. The homeostatic model of evaluation is already common to these extensions and has been the focus of much attention in the literature on cybernetic theory. But the opens systems far from equilibrium model, one that is autopoetic or self-referential, is still undeveloped and will represent the distinguishing characteristic of a true automaton. (HAL represents this stage of potential development).

We are all familiar with tools. We use them all the time. Pencils, erasers, hammers, telephones, atomobiles etc. The classification of an object can depend on the context in which it is seen. For example the automobile can be seen as a tool and as a machine. It is a tool in that it is an extension of our feet and exists as such in the larger context of travel. It is a machine when it is seen to direct the potential energy of gasoline into the actual mechanical energy of spinning wheels. If we install some kind of automatic navigational device, it could also be seen as a highly specific automaton. The computer too can be seen as different instances of the technological progression in terms of how it is used or viewed. The specific area to which I would like to focus these distinctions is in image production and art.

As a tool, the computer can be used to interface analog input devices with digital display devices. By moving thumbwheels or joysticks, an image, for example, may be altered by changing the scale, placement, colors, etc.. A paint program may use a digitizing pen or mouse to record the sweep of the hand across the surface of a digitizing pad. In this respect, the computer is a direct extension of the body or hand and can be easily seen as a tool.

Currently, computer art is primarily concerned with enhancing the older technologies. As a tool, it is useful for making more complex images and for making the production process more efficient. And until it breaks out of this role, computer art will continue to emulate the older paradigms of painting, photography, filmmaking,and other media. Therefore, the criteria that govern good art for the "older" media will tend to govern the aesthetics of what is popularly called computer art.

If we focus on the analog to digital conversions of the computer just mentioned, or if we look at it on the level of manipulating imagery in terms of some predetermined rules of operation(as in the conversion of chemical to mechanical energy above), then we are characterizing the computer as a machine. In the latter case, a good example of the machine is the program that is used to manipulate the objects in the screen space or the screen space itself. (When we talk about the computer as machine in this respect, we have to focus on the activities of the software rather than on the activities of the physical device itself or the programs that drive the devices. In fact, due to the hierarchical nature of programming, many of the software tools or programs are dependent upon the environment in which they are to operate. In talking about the software as machine, the context or software environent in which it is operating is a given). The program takes some aspect of its environment and processes it according to pre-established rules.

Some recent examples of computer generated art that reflects some applications of the computer that are uniquely tied to the qualities of the computer itself are the efforts here at the Ohio State University of Michael Girard and Susan Amkraut at the Computer Graphics Research Group. Using mathematical models derived primarily from physics or other real world phenomena in irreal applications, they have created animations that are impossible, nearly impossible, or terribly impractical by any other animation technique. Rather than setting up keyframes and allowing the computer to do all the "in-betweening", as is usually the case, the mathematical models drive the imagery. But rather than presenting "true" simulations of reality, they are offering what might be termed "expressive simulations". This is probably the use of the computer as a machine in its purest form as a image maker for some other medium. In a similar vein, Yoichiro Kawaguchi, at the Nippon Electronics College, has received well deserved attention for his imagery generated with computer algorithms. By drawing on the growth patterns in nature, he has created morphogenetic algoriths that generate organic shapes.

As McLuhan (1964) notes, the content of one medium is always some other medium or media. The content of the computer will not only be all other media, but the computer medium itself. As a content of itself it is interactive.

Automata and Art

In the case of the automaton, the computer holds an unprecedented potential for the realization of self-reference. In the past, as mentioned above, automatons have been machines set to theatrical ends or based upon homeostatic models of interaction. Their adaptability to novel situations and the products of their actions have been severely limited. With the advent of the computer the possibility of creating purely autonomous systems has become feasible.

One current example of the automaton that has created a stir among art critics and aestheticians is Aaron, a computer activated robot, created by Harold Cohen. Herbert Simon states that "[i]n moments of truth and modesty, creative artists and scientists do acknowledge that their views of the heavens were attained only by standing on the shoulders of giants. So the computer must share its acclaim with Harold Cohen, and with Harold Cohen's teachers, and with all the previous ages of art that have contributed to, and made possible, these particular products"(Simon,1984,p.15).

Now I can appreciate that Harold Cohen stands on the shoulders of his teachers and that image is fine, but when I see that little robot standing on Harold's shoulder, the image begins to change. At that point, and perhaps somewhat unfairly, I see the peg legged sailor out on the deck of a ship in the high seas with a parrot on his shoulder. And in spite fact that random generators may or may not be used, the robot still shares the limitations of the parrot; it can only parrot.

A more serious point that needs to be made, however, is that the generation of art cannot be reduced to a set of rules. Just as self-actualization is a goal in potential, not actuality, art is also a process of actualization. (I am making this claim in spite of the fact that I will be contradicting it below). Aaron can represent at most some aspect of Harold Cohen's artistic endeavor, i.e., the rules of some technique. Assuming that the computer is able to learn, it can only learn in terms of the "need to learn" that has been programmed into it. The needs and aspirations of a fully functioning human being cannot be replicated by a reduction to a set of rules. Trying to capture even a shadow of these uniquely human qualities in some relatively simple device is to mistake one's own potentialities with one's techniques. The processes of art-making involve the presentation of some unique idea in an experiential way. The exciting thing about Aaron is not the "art" it produces, but the fact that Aaron itself is a work of art. Aaron points beyond the fact of Aaron to the idea of Aaron. What Harold Cohen has created is a work of art called Aaron.

Automatons also exist in the form of a number of graphics packages that are available for buisness applications which are currently on the market, and they do make most, if not all the aesthetic decisions for the user, but these are very limited applications to begin with. There are, however, a number of people (e.g., Stiny and Gips) investigating the possibilities of algorithmic aesthetics, but I do not think that the processes of qualitative decision-making for artists (unless they are technical redundancies tailored for or by the artist) can be reduced to a set of rules. Rule generated art suffers the severe handicap of by-passing the creative encounter of experience and will fail, except serendipitously, to direct the appreciative energies of its audience. The area of most promise for algorithmic aesthetics is probably in the applied arts of design and industrial design. Here the parameters of application can be coupled with generalized aesthetic principles to create an aesthetics of utility. But for the area of the fine arts, it would be terribly presumptuous to think that the infinite adaptibilities of the human species can be reduced to a set of rules that point to any sort of meaningful experience of ecosystemic relationship. In fact, as I discussed above, art involves the breaking of rules within the morphogenetic dynamics of self-referential experience. If, however, the computer is generating art works for similarly configured automatons that share the same "needs", then the computer will be eminently capable of creating genuine art.

The Computer as a Medium for Art

An Evolution

Naisbitt (1983), in Megatrends, refers to three levels of technological development that seem helpful here. He states that at first technological change is introduced along lines of least resistance. Then as we find ways to extend and enhance the old technologies, we find new approaches that are inherent to the unique qualities of the new technology itself. Analogously, computer imagery has been widely introduced through home and arcade games,where it has been used more for visual reference or marketing than for art. But as it became commercially viable, the computer was introduced into the production process, as mentioned before, to enhance the older technologies by way of more complex imagery and increased speed of production.

The unique qualities of the computer, its interactive intelligence have only begun to be exploited in the arts. Computer art will eventually involve real-time, intelligent interaction not only as a tool for the artist, but as a medium for an audience. The distinction I make between tools and media in this context is primarily a distinction of intents. The former mediates the activity of a subject on an object and the latter mediates activity between subjects. That is, in the case of art, the tool acts upon the medium and the medium presents the sensory-motor traces of that act upon the medium to some recipient or participant.

In the case of the computer, the participant acts and the program evaluates the act and responds through some medium or media. In this sense the computer is a subject or quasi-subject. But the computer is also a medium in that it is programmed by the artist to present an evaluative response (just as paint is a medium for presenting a static evaluation). The evaluation is made in terms of the idea the artist hopes to convey. But ideally, in computer mediated art, the artist will not be working unidimensionally with a fixed idea. He or she will be concerned with creating sequences of transforming ideas that operate within a larger operative context, and as a function of the shifting audience profiles that it has developed.

Profiles are common as tools for evaluation in many fields, e.g. psychology, economics education. The development of computer assimilated profiles is already quite common, but the development of interactive computer profiles is still in its embryonic stages. The work done by Brown and Goldstein (1977) at the laboratories of Bolt, Berenak and Newman involving the idea of "procedural modeling" represents prototypical efforts in this direction. Once the idea of the continuum have been introduced into AI, these efforts will find fruition.

The development of psychological profiles will require the understanding of levels of psychological development, one's manner of structuring experience (i.e., one's world view and the specific concepts employed), as well as one's personality characteristics. Since the computer presentation will be interactive, rather than at a remove, its manner of presentation will operate within a range of parameters that will attempt to cut across the participants range of meaningful experiences. Just how these profiles will be gathered is an open question.

One manner of assessing the individual is to create profiles by way of their interaction with computer mediated learning (i.e., explanation). By modeling the manner in which the individual learns and the strategies employed, cards embbedded with magnetic storage capabilities could be continuously up-dated and used whenever the participant visits an art exhibit. If the computer at the exhibit has the capability to read the profile, the artwork could be tailor made to direct the individual into new areas of experience that complement their manner of structuring experience.

The role of the artist will be to act within or through the inherited tradition of presentational techniques in order to create an environment or a display appropriate to the needs of the contemporary participant. The artist will also be responsible for identifying and developing new techniques of presentation that reflects the need for growth in the arts. Whereas psychologists and technicians will be charged with the responsibility of developing and implementing profiling systems, the artist will be concerned with the means and manner of the presentation. Therefore the artist must not only be familiar with the profiling system within which he or she operates, he or she must also be able to focus on the immediate level of focus of the individual within the larger context of the participants social-cultural inheritance. This probably means that numerous artists will be on file in the same system. The idea of using the procedural models of artists to interface with the procedural models of explanation supplied by the audience creates a scenario that even a science fiction aficionado would envy.

The medium that an artist chooses represents the sensory biases by which the artist focuses on the structuring of the world. Since the computer could affect presentations in all media, a profile drawn from a multi-dimensional continuum of personality characteristics could be addressed within a continuum of aesthetic correlates. Using Jung's personality typology as a for instance, the sensation type might prefer tactile and mimetic kinds of aesthetic presentations while the feeling type might prefer one that is more abstract and atmospheric.

And now to contradict myself, if the computer is capable of developing "procedural models" of the artists solutions to a wide range of aesthetic issues, and if the computer is programmed to create audience profiles, then the computer could simulate the lived experience and create relevant works of art. This is a lot of what if's, but the steps in this direction are already being made. The essential element, as previously indicated, is the idea of the continnuum.

The aesthetics of interaction is unprecedented in any other media. The communication of ideas is interactive and the artwork becomes an open system far from equilibrium in this communicative aspect. The artist will have to develop his/her ideas in terms of operational principles of interaction rather than in terms of static presentation which characterizes the relative closed nature of communication of older media.

Krueger (1983) at Connecticut, for example, has created interactive, intelligent environments that allow the audience to develop a relationship within the parameters established by the artist. Using the ideas of artificial realities and responsive interaction, an individual or group interacts with an intelligent environment, i.e., an environment into which the participant is located bodily and by which the participant is responded to in ways that suggest some consistent concept of interaction. By determining one's relationship with the environment, through aural, kinetic or visual feedback, the participant might be led to experience some new aesthetic relationship. The artist may also be interested in a computer facilitated interaction between people.

Youngblood states that:

> the author creates not a particular image, object, event or space but rather specifies the laws of an environment that contains many possible images, objects, events of spaces that can be realized by the participant as he or she interacts with that environment according to its laws. But a truly interactive environment becomes conversational-- its laws change as a result of its interactions.

The artist at this level becomes the meta-artist. He or she is concerned with the environmental parameters and all the possible interactions that they entail. And in the same respect, the computer becomes the meta-medium because the audience is responding to the interactive relationship in terms of the images projected on the walls, the aural responses triggered by the sensing devices in the floor, the cursor on the screen that represents their relationship to a mutable maze, etc. Three of the most interesting aspects of Kreugers work with environments is that he is not working with small display devices, that his environments are computer controlled, and that the aesthetic focus is on the real-time interaction or relationship. The most disappointing quality of his environments is that they seem more game-like in orientation than aesthetic.

Communication

Inherent to any interaction or relationship is communication. Communication can be seen as the continuum drawn between the poles of explanation and presentation as I have described above. In Figure 8 , I have created a field of communication that is based upon the dynamics of meaning in Figure 6 and a continuum of expressive movement in Figure 5. Around the circumference of the diagram are a number of means of expression that coincide with the dynamics of the field.

(See Figure 8 in the Appendix)

In the diagram, art lies at the base of the somatic-semantic dimension of meaning with science representing its polar opposite. Both of them lie halfway between the somatic and social matrices. At any time during the processes of communicating with the self, other or others, the act of communicating can be seen to be discrete points or tensions in the field of communication. This field is continuously experienced and modified by the communicants. The dynamics of the field are continuously changing even in the case of pure presentation (art) or pure explanation (science).

In the case that communication breaks down or terminates, the field is destroyed. In the case that communication is transcended, the field is transformed into pure relationship. That is, at the center of the diagram, the octagon represents the window through which one system merges with another. This is a pure openess to experience in a resonant symbiosis. This type of relationship can be called love in its purest manifestation. It rarely if ever exists in its pure form, but glimpses of it have been fiercely documented in religious literature. It is the experiential hub around which most organized religions exist as variously degenerated organs of dogmatism. Or as Chung-yuan (1963) states, "[t]he systems built up by later and lesser minds are the fish nets"(p. 167).

The computer as medium would enclose the entire diagram of communication because it represents the potential to communicate in all dimensions (even intimately, see Kreuger, 1983). As a medium, the computer becomes a performing artist that can "read" its audience at every level of interaction. This means that we will need to fully research and understand not only of the communicative processes, but the processes of mind to create audience profiles from which to operate. The artist will be charged with creating the manifestations of the computers intent (or more accurately, its vehicle of resolve), that is creating the environment in which the interaction occurs and the manner in which the intent is directed.

But the crux of the matter rests with the development of artificial intelligence (AI) which has yet to fullfill its initial promise. AI offers the possibility of setting up decision-making systems that can act on decisions, reevaluate the activity and and make new decisions. Many of the limitations of AI have been expounded by Dreyfus(1982), but those limitations reflect more the current approaches of AI rather than the possibilities of AI as such. All of the approaches in AI that I have come across, and my exposure is limited at best, try to account for the processes of mind in terms of cognition. This approach reflects not only the limitations of digital computers but the methodologies of the researchers. I think, as my characterizations of the processes of mind and awareness point out, that we will have to address the possibility that cognitive processes rest on an continuum. Without this relationship, the limitations of processing linearly, even in the guise of parallel processing, will not be overcome. (Perhaps the developments in "fuzzy logic" will point toward some fruitful gains for this area in the future, but even here the potential seems slight).

Some Other Possibilities

Another avenue of potential artistic merit is computer mediated perception. Here I am talking about shaping senory surrogates. Given a set of sensory interfaces, the artist could shape the ways these modalities process the information about the environment.

Consider the technological advances in the replacement or enhancement of lost or dysfunctional sensory abilities (for example, the loss of sight or hearing). How will these devices shape the way people experience the world. At the Smith-Kettlewell Institute in San Francisco, Carter Collins (Hechinger, 1981) is impressing televised images onto the skin using electrical stimulation in a project called Tactile Sensory Replacement (TSR). With a TV or digitizing camera mounted on the head near the eyes, a televised image is translated into vibrating cones analogous to the pixels on a TV screen. As the cones vibrate in video configurations across the patch of skin, the blind subject becomes more and more accustomed to the waves of sensation passing across the surface of the patch. After some acclimation, the subject is able to discriminate shapes within a field that corresponds to the configuration of the patch of skin that is being stimulated. And though the stimulation is on the subject's back, in this case, the image is reported to be in the head. Similar research is now being done by the Biomedical Engineering Center at the Ohio State University (Lore, 1984).

I think that it is these kinds of technological developments where the senses are extended or replaced by electronic devices that the artist will begin to look for new ways to shape the interfaces and consequently the relationship one has with the world. Another area of exploration is suggested by the work of Minsky (1980) at MIT who has been working in the area of telepresence. Here a person "experiences" the presence of a remote environment by way of the sensory devices implanted into some kind of robotic transmitting device. This kind of vicarious experiencing or interfacing with a remote environment also suggests interesting possibilities for the artist.

As an extension of these artistic possibilities, the computer may also be used to play directly with the attempts of the audience to reach closure. For example, if the computer is equiped with sensing devices that are able to detect when the participant is about to focus and quickly create a shift that requires re-focusing and makes a shift, across the patch of skin, the blind subject becomes more and more accustomed to the waves of sensation passing across the surface of the patch. After some acclimation, the subject is able to discriminate shapes within a field that corresponds to the configuration of the patch of skin that is being stimulated. And though the stimulation is on the subject's back, in this case, the image is reported to be in the head. Similar research is now being done by the Biomedical Engineering Center at the Ohio State University (Lore, 1984).

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As an extension of these artistic possibilities, the computer may also be used to play directly with the attempts of the audience to reach closure. For example, if the computer is equiped with sensing devices that are able to detect when the participant is about to focus and quickly create a shift that requires re-focusing and makes a shift, relationships created by our technologies, our inability to understand the original intent of the technology will continue to disappear and we will blindly seek meaning in the proliferation of technology itself. The initial need to subdue some aspect of the ecosystemic relationship in order to create a more discrete relationship to it becomes uncontrollable when we ourselves are defined by the technique. The metaphor of making discrete becomes the metaphor for destruction if the direction of meaningfullness moves further and further out of the somatic matrix which engendered it. The meaninglessness of alienation, the separation of action from evaluation, makes us schizophrenic. Without meaning, we risk the claims of some high lord of schizophrenia who shapes the pain of our meaningless existence into a distorted goal of displaced aggression called scapegoats. At this point all our goals become emergencies and our social interactions take on the character of guerilla warfare.

The other extreme, toward the passivity of evaluation which is inherent to the appreciation of presentation, but at the expense of explanation, leads less to destruction of the organism as to the destruction of the unique potentials of the organism. This stance is implicit to the arch proponents of the "back to nature" movement and represents a reaction to the technological distortion in which we now live.

The modern technological achievements in communications have created an increase in entropy, not less, in the once provincial minds of humanity. Exposure to vast quanities of information results in the profanation of all that was once held to be meaningful and secure. All of this disorder has left us acutely aware of the limitations and relativistic nature of our constructs. The artists, scientists, editorializers and commentators who have helped us build a stage in this dark surround now stand before us in the spotlight of their own artifice. Our eyes are now focused back on the diffused glint of light reflected in the eyes of the audience. It is in those eyes that one can see the need for self reference, not the traps and snares of others. We need some new approach.

Symbolization and evaluation cannot ever be entirely divorced as functions of epistomology. They complement one another and a healthy epistomology is dependent upon the balanced interaction of both. But since we live in an unbalanced relationship with ourselves and with our environments, we need to find ways back to a more meaningful understanding of this relationship. I suspect that technology holds its own salvation specifically in the form of computer mediated interaction.

Modern technologies and communications systems have given us the ability to bring all of the histories of thought, art and religion to the fore, without offering us a way to receive it. With the computer and the development of artificial intelligence, we will eventually be able to interactively seek explanation and evaluation in the uniquely tailored dimensions of our own needs configuration.

It is difficult to speculate on the social and cultural implications of the computer as a medium. It is not an event that will explode on the aesthetic or intellectual scene. Part of the preparation for its arrival will undoubtedly lie in the infiltration and integration of the computer into the lives of those of us who will one day participate in computer mediated exhibitions. But even the idea of an exhibit connotes a sense of locality that may be wholly inappropriate in the future. Perhaps computer art will be an integral part of our very day-to-day existence.

The one possibility I do like to speculate on, and it is somewhat utopian, is this idea that computers will place art in a more intimate relationship with society at large. Perhaps the environment in which we seek explanations will also supply us with presentations. I am sure that computers, as have all media, will be used to exploit the quick and the easy enjoyments of a more hedonic nature, but if only by its sheer pervasiveness, perhaps the computer will be able to direct people toward a more aesthetic and creative relationship with their own and others potentialities.

We must not forget that in this age which has been variously characterized as the space age, the post-industrial age, the information age and so forth, ~~and~~ that on the bottom line, we live in the nuclear age, or the age of the Bomb. Many prescriptions for utopian dreams have been held before us in all ages in an almost desparate attempt to be heard and heeded, but for the most part, they are not heard and heeded.

And as before, we will go on into the future by whatever means present themselves.

The computer as a medium for art is therefore not discussed here as a prescription for the future. The future arrives in its own due course. But with that future will be computer art and I think that the alienating effect of technology will finally be turned back on itself as the healing effect of evaluation is finally included as a potent factor in the assertion of our individual and collective needs and aspirations.

The fear of the dark surround is a condition of having always focused on the stage. To exploit this condition for short or even long-term gain is eminently destructive, as we can now see. To reorient ourselves to the stage and stand upon it as an actor looking out into the dark, we will see a larger light out beyond the glare of the artificial spotlight of our inverted needs. We are autopoietic by nature and we need to find meaning in terms of self-reference. Jantsch (1980) states that "we are not the helpless subjects of evolution-- we are evolution" (p. 8).

The introduction of the interactive computer relationship will answer the need for an integration of disparate disciplines of specialized knowledge. Generalists will be needed to coordinate these vast areas of knowledge to create total environments of explanation and evaluation. One challenge will be to transcend the idea of types or categories and actually address each and every unique individual. The old dualistic notions of epistomology will have to be seen as a developmental stage within the overall process of individuation and Self-actualization.

The computer as a medium for art will offer unprecedented numbers of people the possibility to actualize their potentials and build the aesthetic bridge to a more compassionate orientation to life. It will permit us to see conflict within the larger frame of growth and allow us to gain a vision as a society to direct that growth toward the unique needs and aspirations of the species. Fundamental to this shift will be an orientation away from the dichotomous subject-object epistomologies that confront us in our technologies to a world view that reflects our ecological relationship to life in terms of growth and development. But even this is not enough. Ultimately, we have to create some socially sanctioned form of ontological affirmation. Without this shift in orientation, we will not have the overall self-generated direction that the impositions of ideologies and technologies have tried to hide.

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Footnotes

[1] I will be referring here to Hamilton's (1969) version of the tale by Apuleius.

[2] My primary source for this synopsis is Hillner (1984).

Author's Notes

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I would also like to thank Professor Charles Csuri and Dr. Louis Lankford for the assistance and advice they gave me, as well as for the confidence I gained from them.

Finally I would like to thank the folks at the Computer Graphics Research Group for all the stimulating and creative moments that we have had. That is what makes being here worthwhile.

Appendix

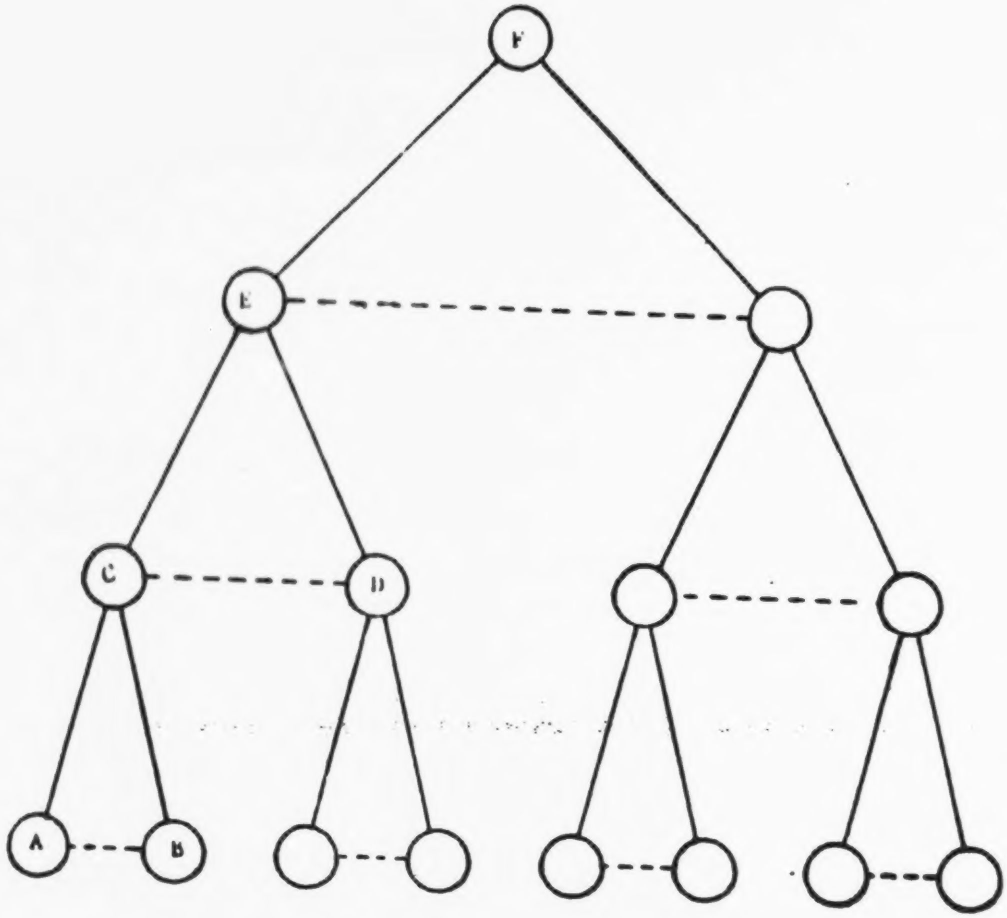


Figure 1

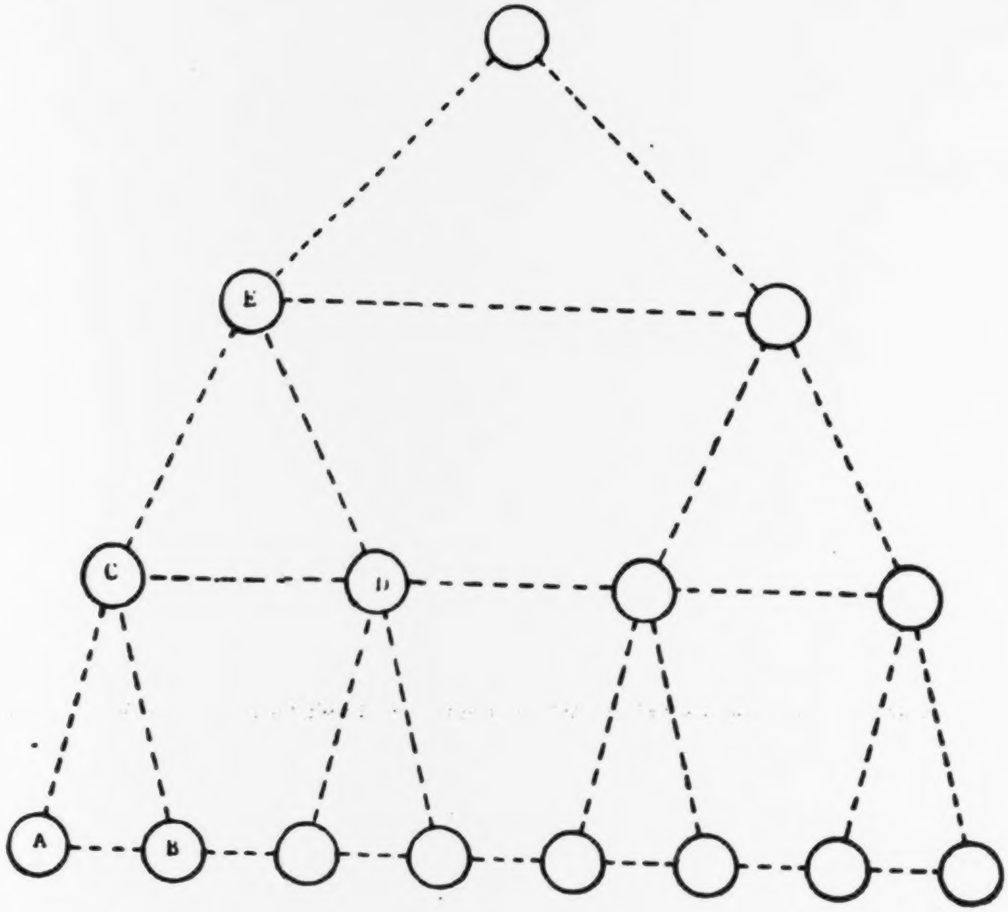


Figure 2

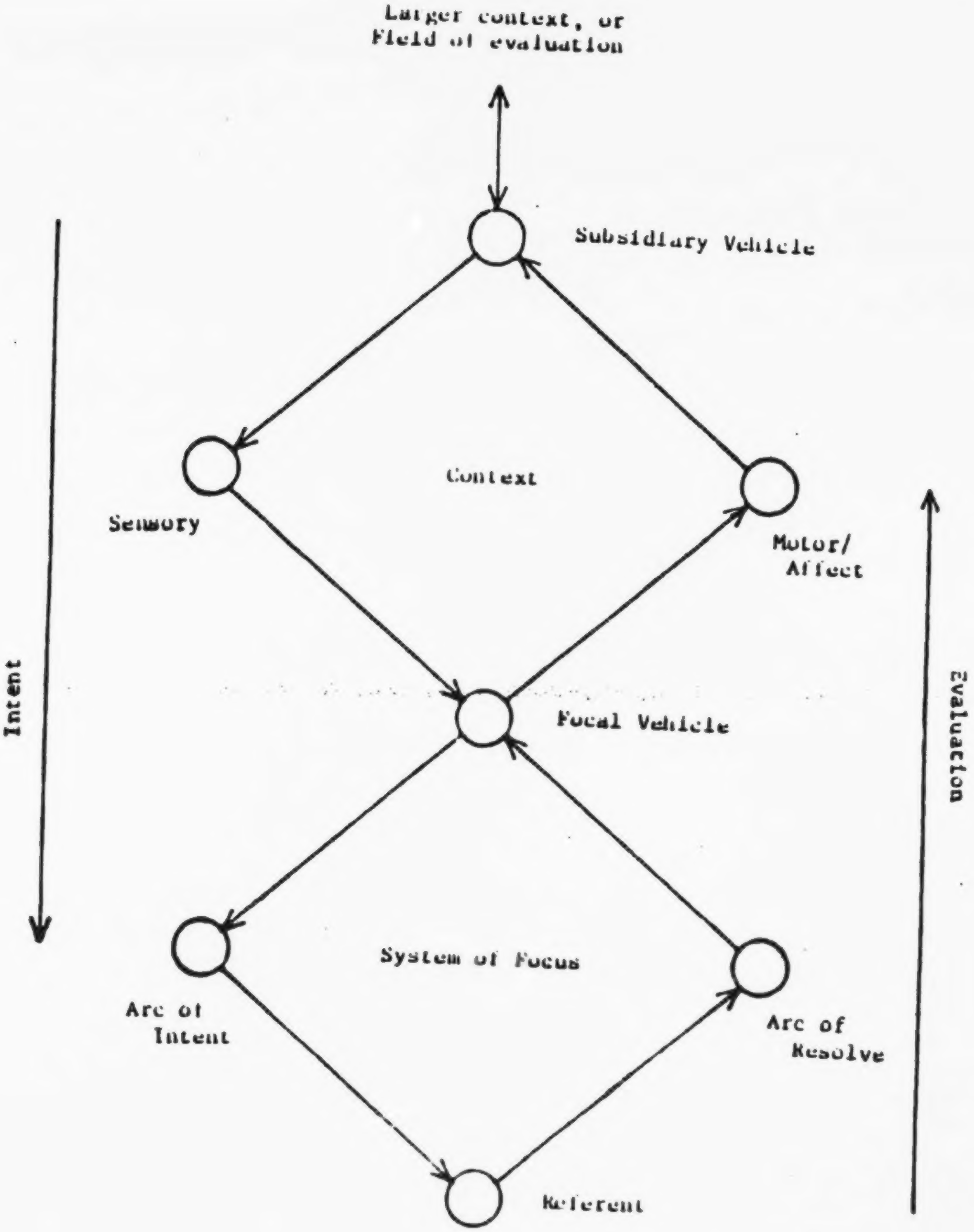

Larger context, or
Field of evaluation
Subsidiary Vehicle
Sensory
Context
Motor/
Affect
Intent
Evaluation
Focal Vehicle
Arc of
Intent
System of Focus
Arc of
Resolve
Referent

Figure 3

ACTION	EVALUATION
Vehicle of Intent	Vehicle of Resolve
Vehicle of Resolve	Context
Context	Field of Evaluation (or larger context)

Figure 4

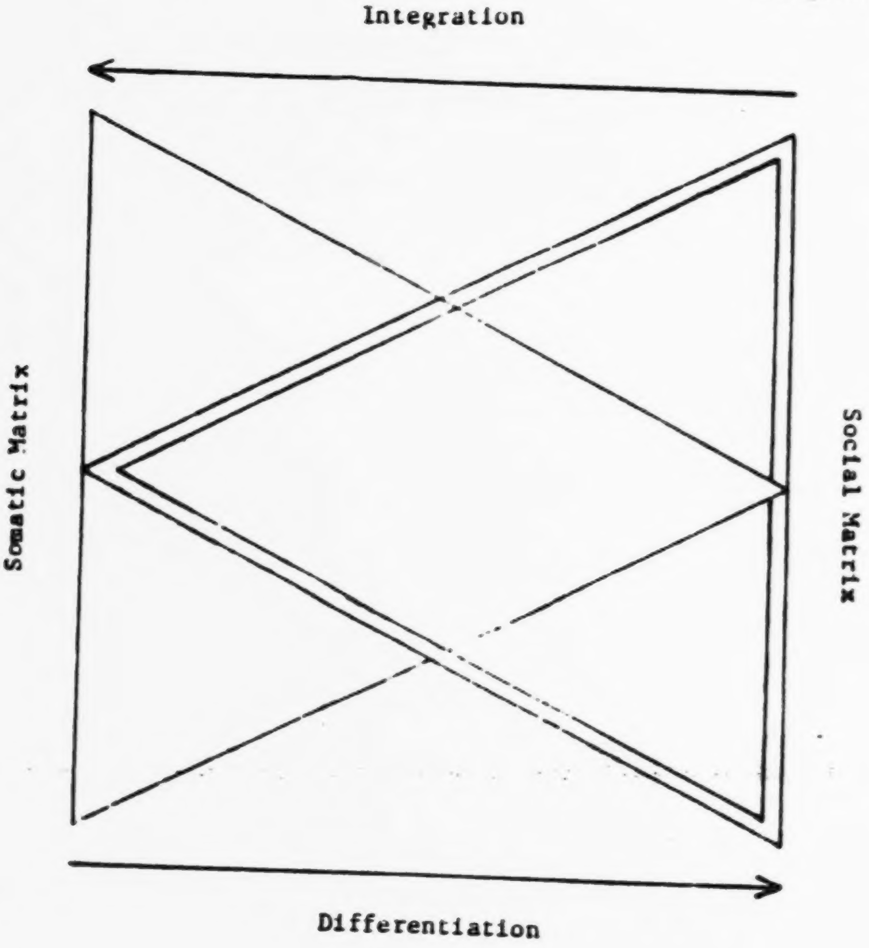

Integration
Somatic Matrix
Social Matrix
Differentiation

Figure 5

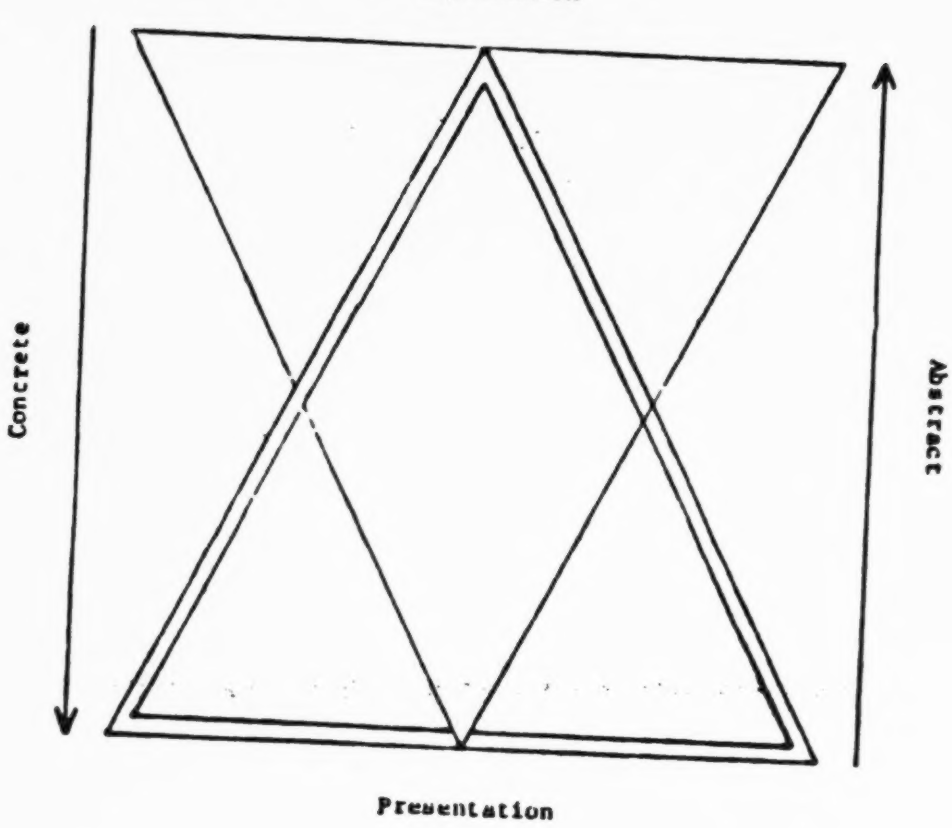
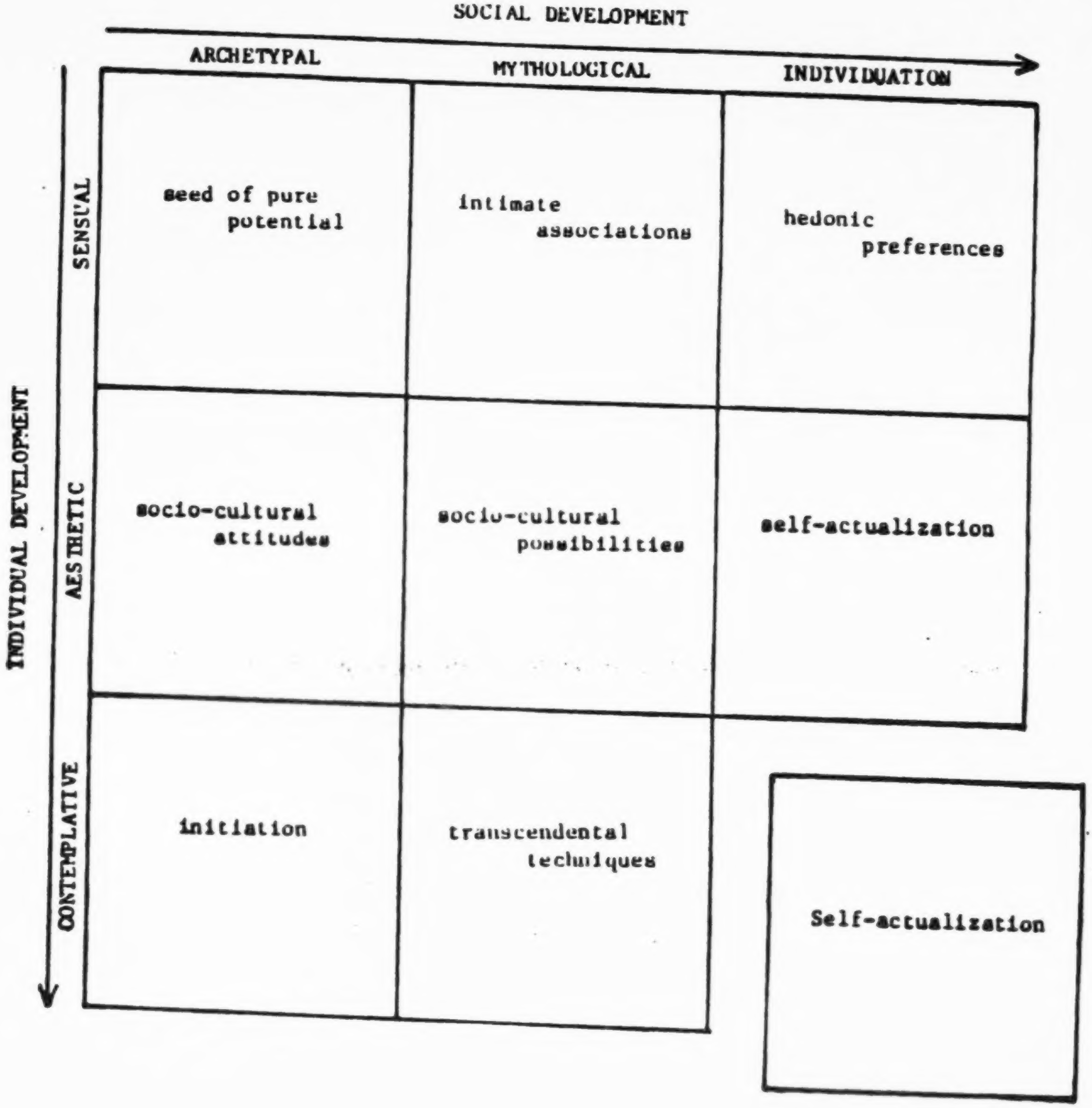


Figure 6



SOCIAL DEVELOPMENT

INDIVIDUAL DEVELOPMENT

	ARCHETYPAL	MYTHOLOGICAL	INDIVIDUATION
SENSUAL	seed of pure potential	intimate associations	hedonic preferences
AESTHETIC	socio-cultural attitudes	socio-cultural possibilities	self-actualization
CONTEMPLATIVE	initiation	transcendental techniques	

Self-actualization

Figure 7

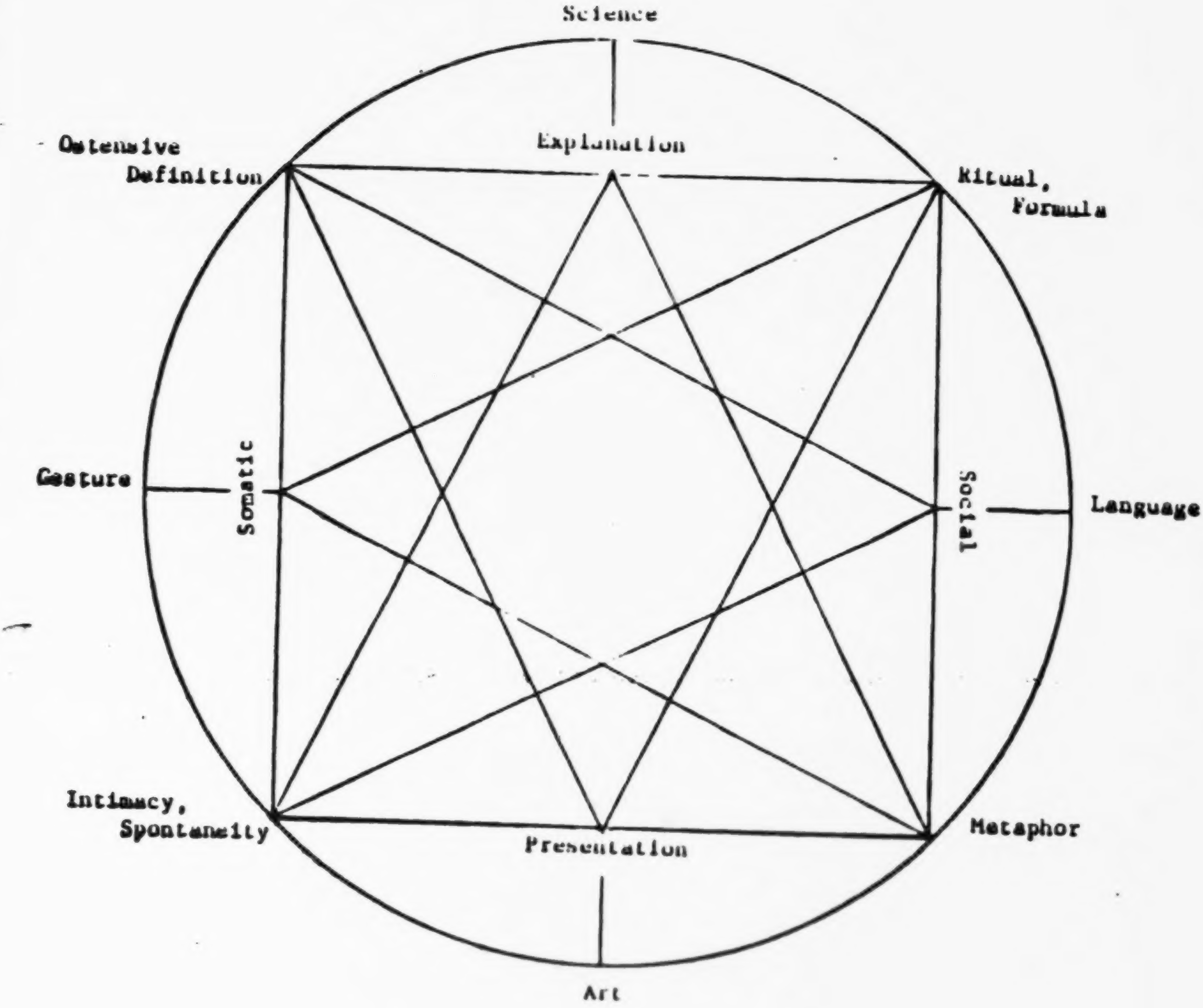

Science
Ostensive Definition
Explanation
Ritual, Formula
Gesture
Somatic
Social
Language
Intimacy, Spontaneity
Presentation
Metaphor
Art

Figure 8